ENGINEERING NEWS-RECORD

AUG. 10, 1961

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Construction Booms in West Germany

p. 32

A McGRAW-HILL PUBLICATION

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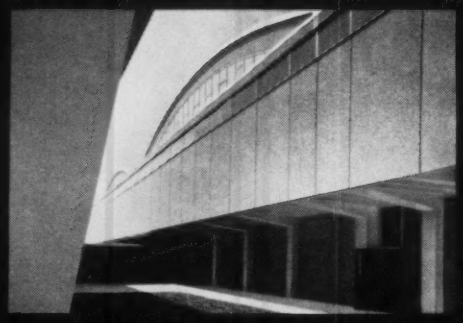
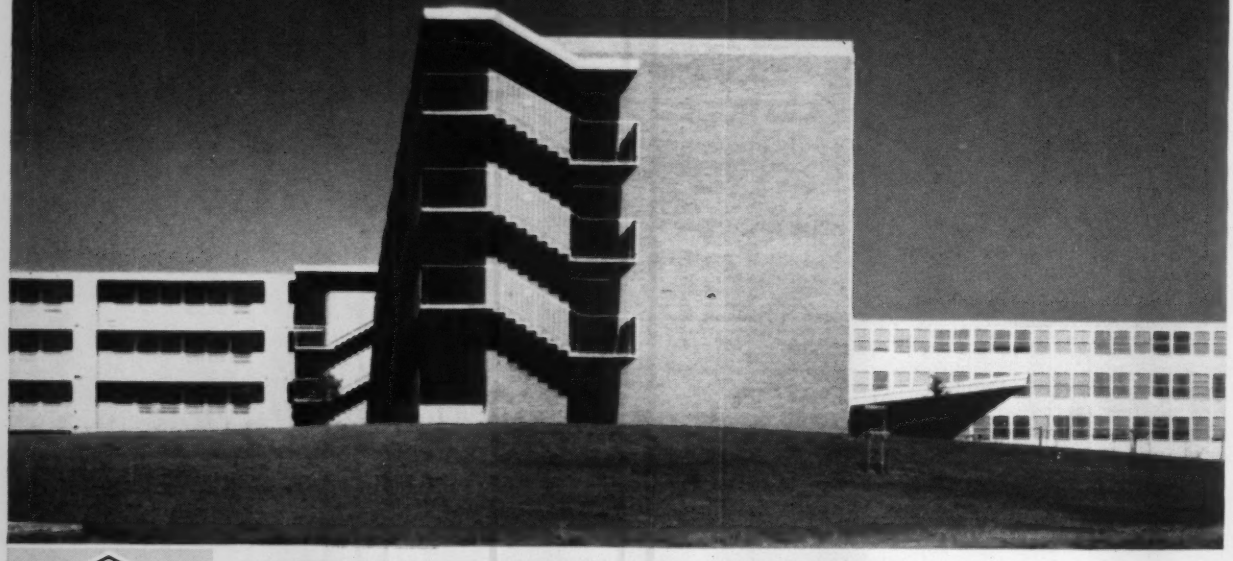


Two fine new buildings at North Carolina State College, Raleigh, demonstrate the ruggedness, beauty and economy of concrete. You see it throughout the Physical Education Building (above) and Bragaw Dormitory (below) . . . in precast concrete panels of exposed aggregate . . . in exposed concrete stairs . . . even in the concrete floors selected for superior noise suppression qualities, a major consideration with college housing. Penn-Dixie Cement was one of the ingredients used in these substantial structures.



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Pouring a steel-reinforced slab 7-ft thick

A steel-reinforced slab seven feet thick at the center, twelve feet thick at the edges, forms the bottom of the world's largest drydock at Bremerton, Washington. The slab is so thick that much of the concreting work was done *between* the layers of steel bars.

More than 5,000 tons of Bethlehem steel reinforcing bars were used in the drydock bottom; another 4,000 tons will be used in building the walls. The dock will extend nearly 1,200 ft into Puget Sound, terminating in about 60 ft of water.

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Latest addition to the Naval Shipyard at Bremerton, Washington, is a huge drydock designed to service aircraft carriers. Moran, Procter, Meuser & Rutledge of New York, and Carey & Kramer of Seattle are architects-engineers. Manson-Jones-Perini-Osberg are joint venture general contractor. Work is supervised by the Officer in Charge of Construction, 13th Naval District Public Works Office, for the Navy Bureau of Yards and Docks.

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ENGINEERING NEWS-RECORD

EIGHTY SEVENTH YEAR OF PUBLICATION

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Want to be an Executive?

Management is actively looking for engineers who have the desire and ability to become administrators

by
James M. Jenks

In a sense, this is the golden age for engineers. Once buried in corporate obscurity, many of them have emerged today as likely heirs apparent to the big jobs — and the big rewards — of business and industry. One impressive indication of this growth is that money spent in research and development over the past fifteen years has increased six-fold.

Despite this stepped-up activity, however, the once disorganized scramble for engineers seems to have ended . . . at least temporarily. And perhaps it's a good thing. Actually, the more perceptive engineers had always realized that unusually high starting salaries were often illusory. The gap between money being offered beginners and the incomes of experienced men was narrowing rapidly. Further, more and more thinking technical men concluded that even top engineering salaries are low when compared with the remuneration of highly placed general executives.

A Plan to Help the Engineer Succeed

Happily, there is a route to increased incomes that is satisfying to both engineer and company alike. This route leads into *management*. It is no easy road but the rewards are great for those willing and able to follow it.

In the vast, complicated world of business the engineer has much to learn. As a manager his duties will bring him into contact with accountants and buyers, advertising men and salesmen, lawyers and other executives. A strange new set of circumstances confronts him. He must gain confidences and be understanding, learn and instruct, be sympathetic, paternal or commanding as conditions require . . . and all in the midst of a business organization about which his knowledge is limited.

Actually, it comes down to this: To succeed as a business executive, the engineer must learn the art of making decisions quickly and accurately. And this ability is, of course, directly dependent upon knowledge. The "principles" of business—while not as scientific and inexorable as those of engineering—are no less important . . . no less essential to efficient procedure.

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We believe that this little book will help any man get down to bedrock in his thinking; however, there's no cost or obligation for it because—frankly—we've never been able to put a price on it that would reflect its true value. Some men have found a fortune in its pages.

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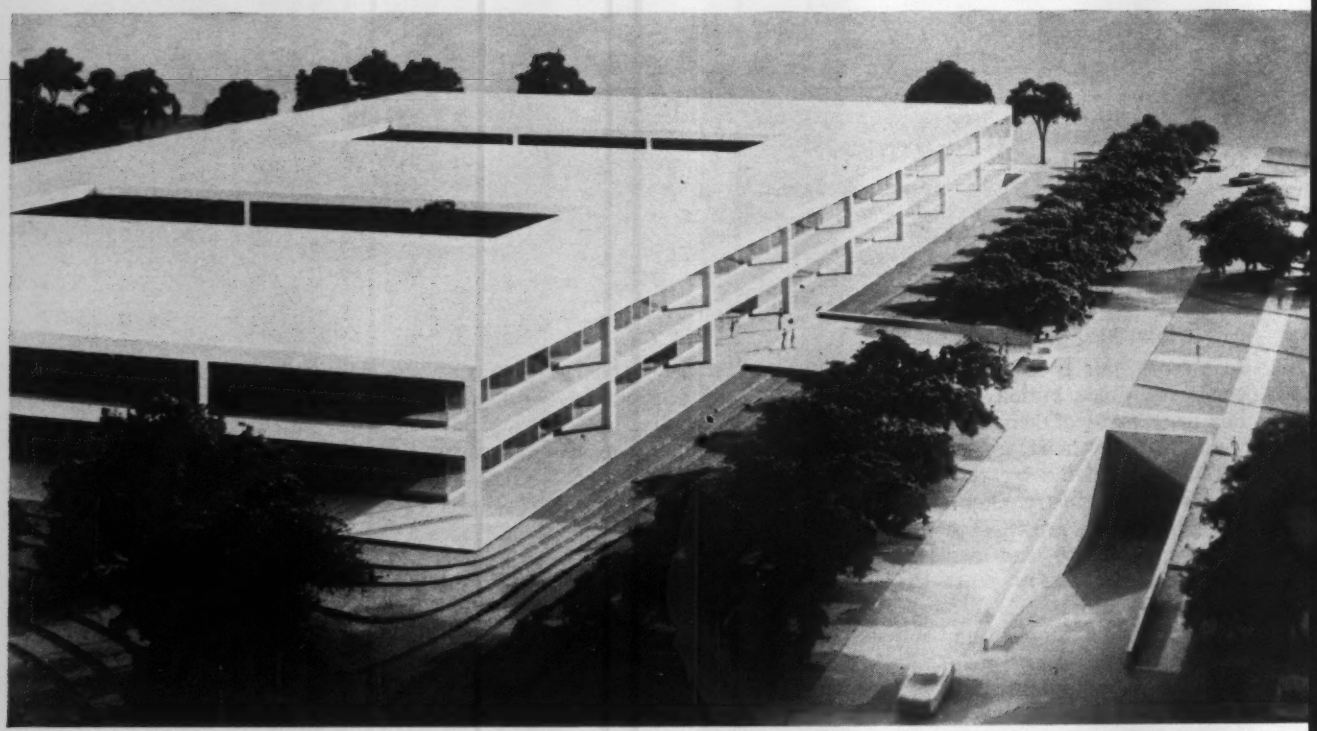
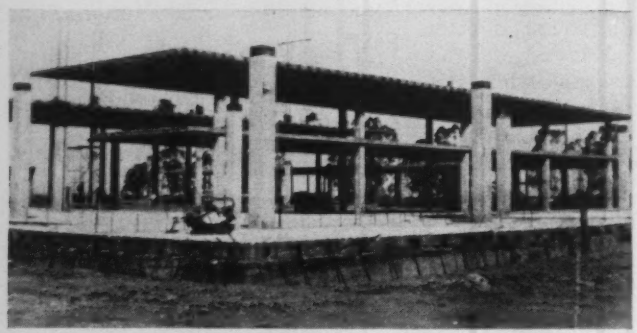
27B

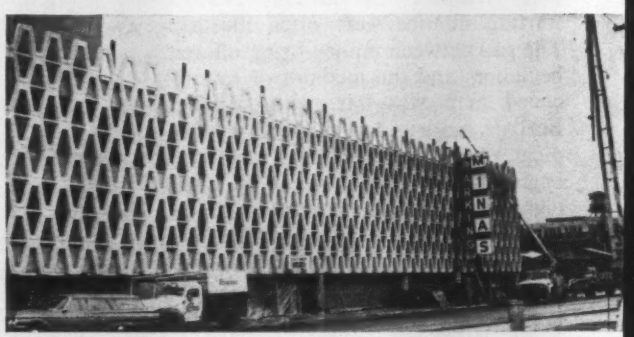
NEW...IN PRESTRESSED CONCRETE
these dramatic projects post-tensioned by Ryerson



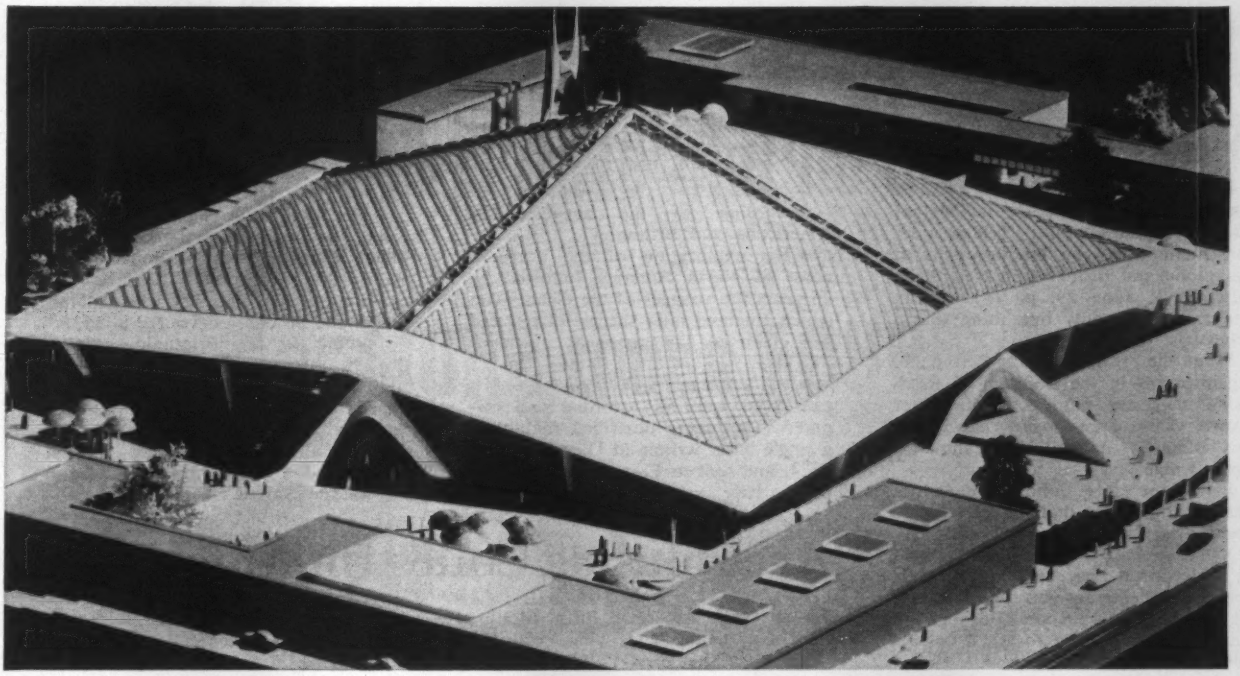
United Air Lines Executive Offices—Chicago. Continuous 2-way, waffle-type slabs 2′6″ thick. Column spacing 60′x66′. Now under construction. **ARCHITECT:** Skidmore, Owings & Merrill. **CONTRACTOR:** Gust K. Newberg Construction Co.



St. Pius X Seminary—Galt, Calif. Lift-slab construction. 9″ flat slab and approximately 30′ column spacing. **OWNER:** Roman Catholic Diocese of Sacramento. **ARCHITECT:** Harry J. Devine. **ENGINEER:** Ernest Francis. **GENERAL CONTRACTOR:** Continental Construction Co. **LIFT-SLAB CONTRACTOR:** Vagtborg Lift-Slab Corporation, Los Angeles, Calif.



Multi-Level Parking Deck for Minas Department Store, Hammond, Indiana. Non-structural 2″ to 6″ topping on precast T beams post-tensioned two ways to provide crack-free weatherproof slab. Edge beams cast in place with conventional reinforcing. **BUILDER:** Triangle Parking Corp. **ARCHITECT & ENGINEER:** DeLeuw, Cather & Co. **CONTRACTOR:** Roy C. Clark, Inc.



Century 21 Exposition Coliseum—Seattle. Column-free interior 400′ square, 115′ high. Edge beams are post-tensioned and aluminum roof panels are supported by tensioned cables of galvanized wire. **BUILDER:** State of Washington, Dept. of Commerce & Economic Development. **ARCHITECT:** Paul Thiry. **CONTRACTOR:** Howard S. Wright Construction Co.

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As use of prestressed concrete gains momentum, Ryerson continues to set the pace with a complete service for this type of construction. Using the BBRV system, Ryerson post-tensioning service makes prestressing more practical and economical than ever—and presents new and dramatic construction opportunities such as those illustrated here.

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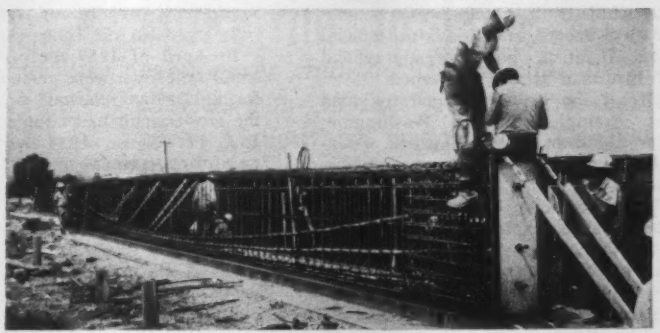
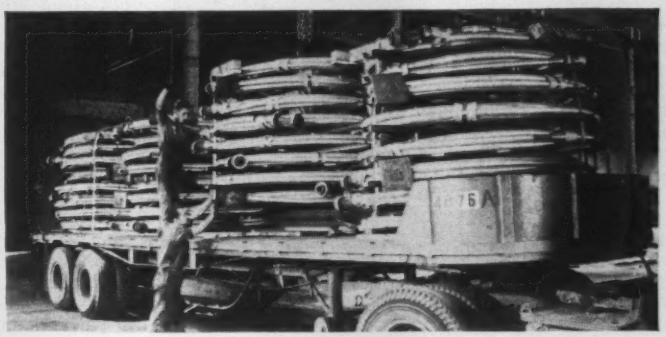
For further information on post-tensioning and other Ryerson products and services for the construction industry, contact your nearby Ryerson plant.



Post-Tensioned Precast I-Beam—showing Ryerson assembled tendons and reinforcing in place.



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Verrazano at the (Narrows) Bridge

SIR—I have read with a great deal of interest your article on the bridge under construction between the boroughs of Richmond and Brooklyn in New York City (ENR June 29, p. 24). I can find fault with only one thing that I believe is fundamental.

When the bridge was proposed, many organizations in the Borough of Richmond suggested names for it. After several years of controversy the bridge was officially named Verrazano-Narrows Bridge.

I was therefore quite astounded in reading the article that, in referring to the bridge, you did not use the officially designated name. I am quite sure that as a technical journal you do pride yourself in being correct. I believe that many individuals in the Borough of Richmond would like to see a correction made in your next issue.

F. VIOLA
Staten Island, N. Y.

SIR—How could a great magazine like ENGINEERING NEWS-RECORD use the half-truth name of Narrows Bridge? The whole-truth name is Verrazano-Narrows Bridge, and this is the official name. It satisfies both the geographical and historical groups concerned.

Of all the bridges named for men (for example, George Washington, Henry Hudson, Walt Whitman, Alexander Hamilton) the Verrazano-Narrows is the most appropriate for the following reasons:

- Verrazano explored the entire coast of North America from Florida to the Gulf of St. Lawrence.
- He discovered New York Bay and sailed up what is now known as the Hudson River.
- He discovered the states of North Carolina, New Jersey, New York, Rhode Island and Maine.
- His description of the coastline is truly remarkable and extremely accurate.

When you realize what Verrazano accomplished in his lifetime, you will become, like me, a strong supporter of the man. Be fair, use the Verrazano-Narrows name in all future articles.

TOM RAGANATI
New York, N. Y.

Editor's Note: In calling it the Narrows Bridge, ENR is merely identifying this great structure with the name by which it has been known for so long and will most certainly be known, despite its official handle (ENR July 6, p. 96). As to Giovanni da Verrazano: History does credit the man with the discovery of New York Harbor and the mouth of the Hudson. His main activities at sea were as a corsair (pirate) employed by Francis I of France.

According to the encyclopedias Americana and Brittanica:

- His exploration of the northern coast of North America followed by 26 years the voyages of the Cabots (on which England later successfully rested her claim to the continent north of Florida).
- His exploits on the North American coast were ill recorded and disputed. They were described mainly in a single letter written at Dieppe in July 1524, and sent to Francis I as a report on the trip.
- His fate, according to the Americana: "In 1527 he embarked on another expedition, also under royal sponsorship, to Brazil. There he was captured by the native Carib Indians, killed, and probably devoured in 1528." According to the Britannica: "It is thought that he was either killed by Indians or hanged as a pirate on a later expedition to America, probably South America."

With all, we've nothing against Verrazano—except his name prefixed to that of the Narrows Bridge.

Are Housing Codes Un-American?

SIR—I have just read Fifth Month: Still No Code and your editorial Slumber in the West (ENR June 29, p. 19, 60) taking the people of Phoenix to task for repealing this housing code. My candid opinion is that you may be wholly ignorant of just how vicious this housing code is. I led the fight against just such a housing code in Springfield, Oregon, and it was successfully repealed on June 28, 1961.

In April of 1959 the people of this small mill town were persuaded to vote for an "urban renewal" program after the city council had adopted a housing code in August, 1958. In 1959 the uninformed voters passed the urban renewal program by a 142 margin; this June it was repealed by a 2 to 1 majority when the people were informed!

After the repeal of this "code" the head of the housing authority pushing urban renewal said in reply to our charges that the people would never have voted for it had they been told the true nature of this socialistic monster: "The complexity of the program and the misunderstandings about how it works make it difficult to inform the voters properly on this issue prior to an election." This is an admission by the "experts" that they don't dare tell the truth—no city would ever accept this urban renewal program.

The area chosen for this "experiment" was not a slum area—it was an average neighborhood of medium priced homes, owned primarily by elderly, retired couples. They were uprooted and some shoved into a federal housing project, a part of the whole stupid program. Some 63 homes—far better than the barracks built in the "low-cost-housing" project—were demolished. The price paid these evicted home owners was in most cases well below the appraised value.

Either you are completely uninformed as to the true nature of this program or you favor government control by a strong centralized federal power over our homes, our lives and every activity of freedom-loving American citizens. I, for one, do not accept this without a fight.

EULA B. PRIVAT
Springfield, Ore.

Editor's Note: As we said in our editorial, Phoenix didn't have to disqualify itself for federal aid in order merely to reject federal urban renewal projects. Any city without a housing code outlawing outhouses, unvented gas heaters, inadequate living space and other dangers to public health and safety is unequipped for life in the twentieth century. Mrs. Privat says that Springfield's building code covers many items normally governed by a housing code.

A Lot's in a Name

SIR—I am a public relations type who had no anxieties until I read your editorial "Naming the Baby" (ENR July 6, p. 76). In it you suggest the best name for the Chesapeake Bay Bridge-Tunnel is "The Chesapeake Bay Bridge-Tunnel." My anxiety stems from a fear that this name might lead motorists to confuse this mighty structure with Maryland's "Chesapeake Bay Bridge" which spans the Chesapeake Bay a few miles to the north.

WILLIAM JABINE, 2ND
Chief
Bureau of Highway Information
State Roads Commission
Baltimore, Md.

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GOODYEAR

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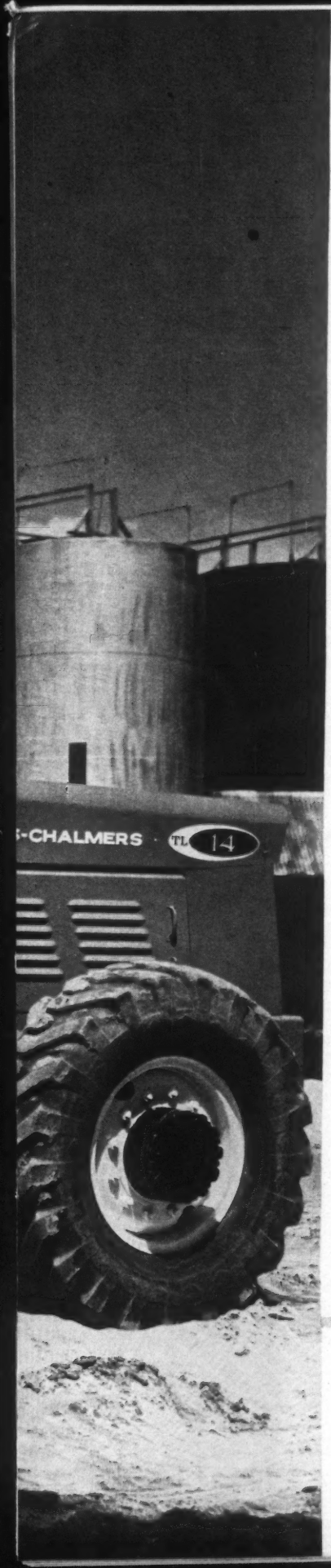
4. MORE rim "firsts": The first *true* earthmover rim, the first 5° rim, the first tubeless rim—in fact, every major earthmover rim advance was made by Goodyear. Result: The very latest in rim design and manufacture at work, for you.

What better reasons for choosing Goodyear as your rim supplier? Only these: The desire and ability to design and build any rim that may be needed for *tomorrow's* earth-moving equipment. No matter what your rim needs or plans, you'll find it pays to call on Goodyear. See your local rim distributor, or write: Goodyear, Metal Products Division, Akron 16, Ohio.

Lots of good things come from

GOODYEAR



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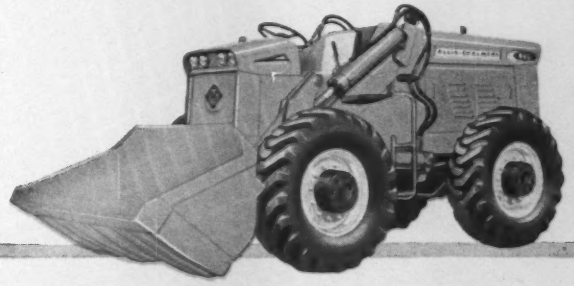
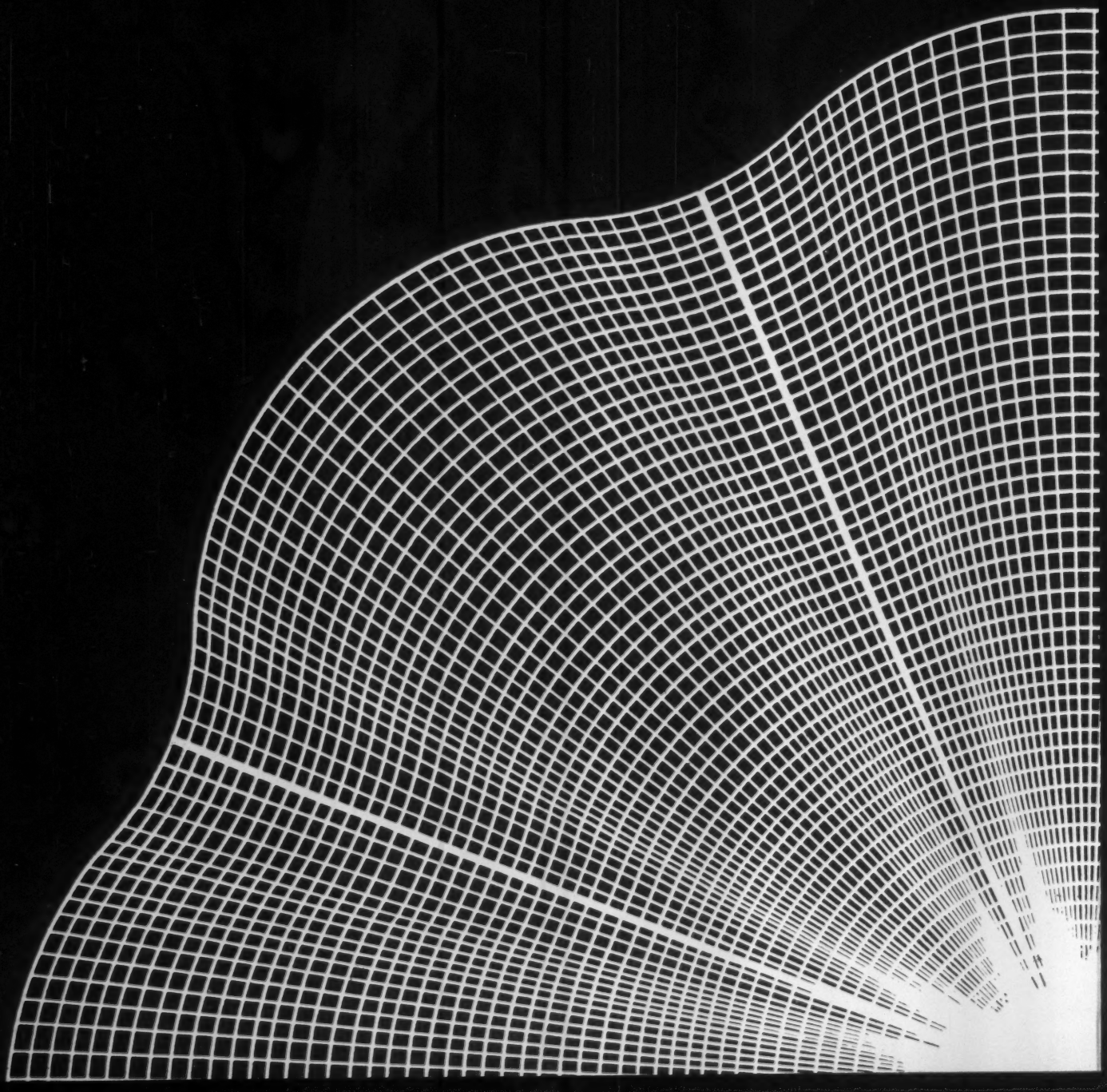
Allis-Chalmers offers 6 tractor loader models—ranging in power from 76.5 to 184 horsepower—in carry capacity from 3,600 to 10,500 lb and with buckets available from 1 to 6 cu yd.

STEP UP YOUR

Performance
Operator comfort
Wearability
Ease of maintenance
Reliability



WITH **ALLIS-CHALMERS**
POWER FOR A GROWING WORLD



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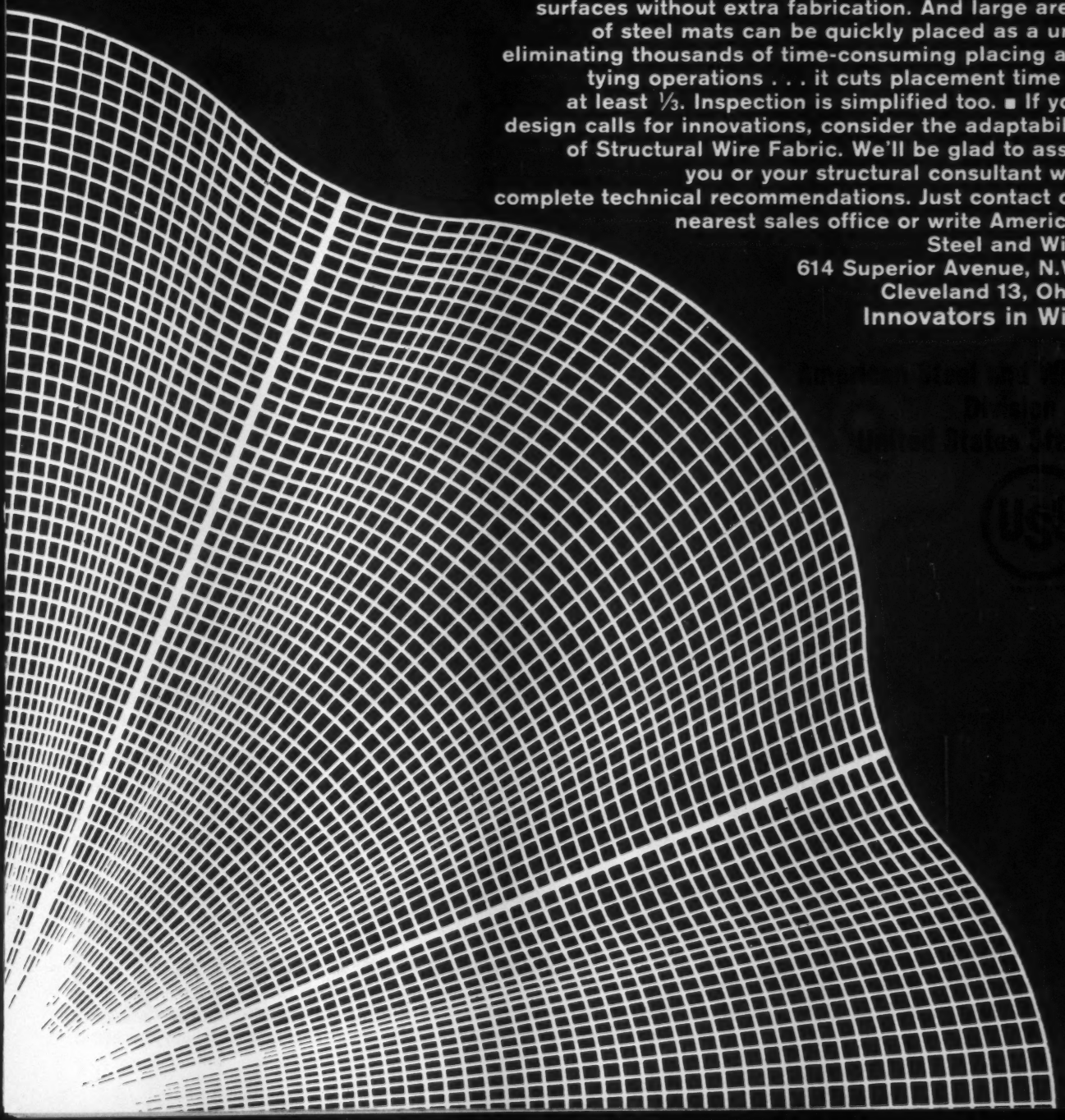
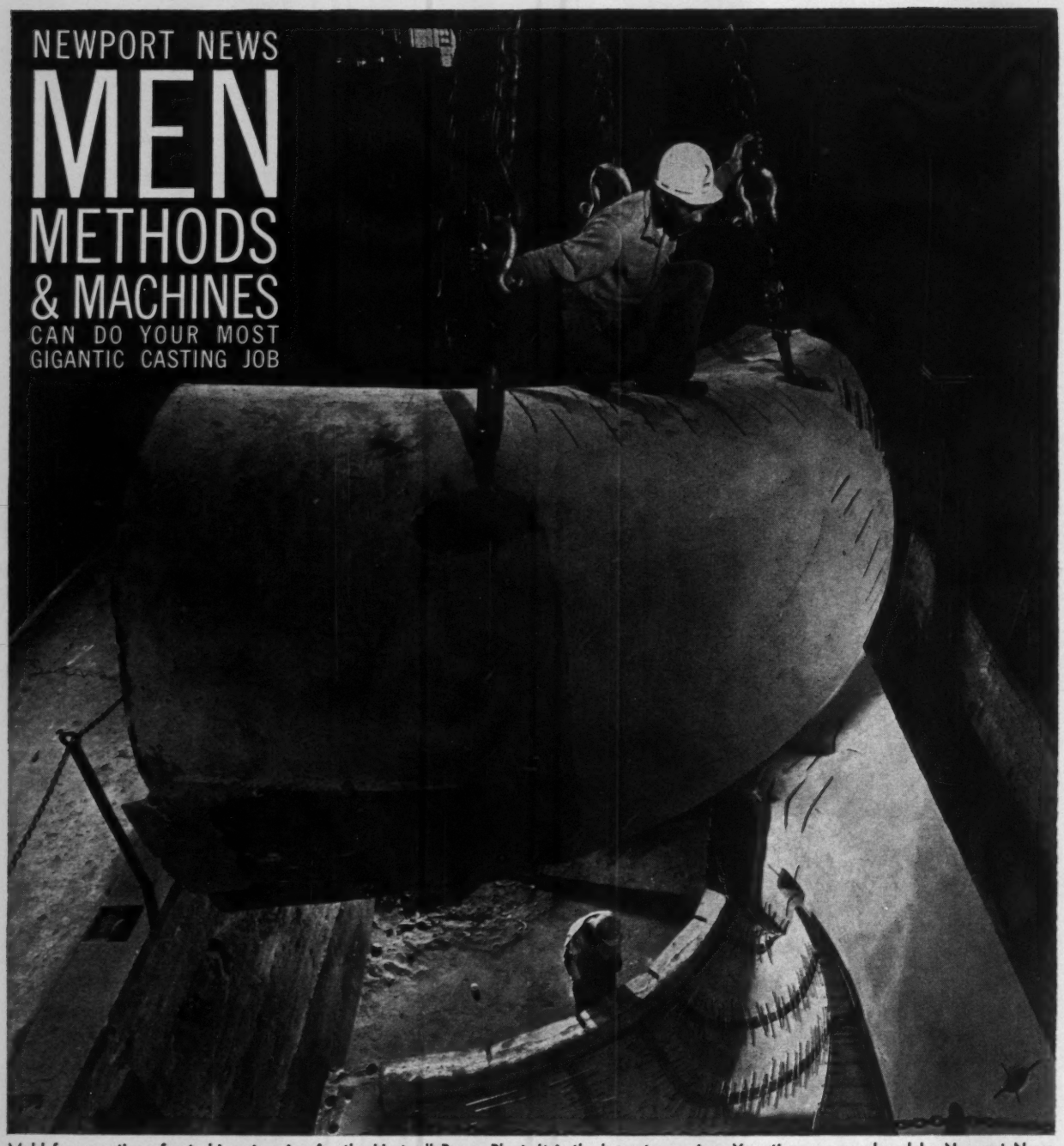
Innovators in Wire





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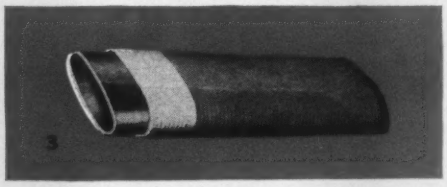

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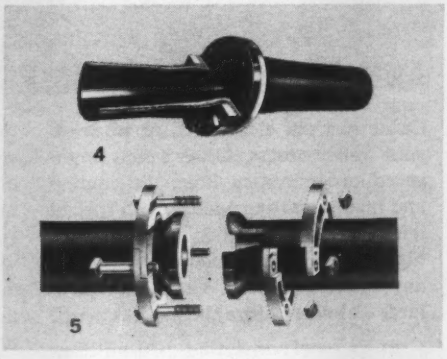

Big T Hose

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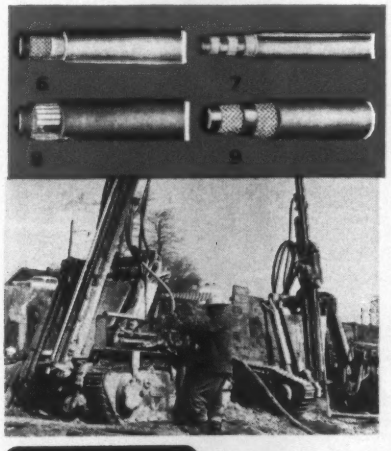
6. THUNDERBIRD. Tops for economy, durability and safety. For use with heavy air drills and pneumatic tools in the construction field. In 10 sizes from ⅜″ to 4″. Wire braid construction for high burst strength. Bright yellow cover for easy identification.

7. THERMINE. Built for rough jobs. Sturdy braids of high-tensile rayon, bonded by tight gripping friction, produces hose that won't kink or twist under pressure. In 8 sizes from ⅜″ to 2″. Working pressures to 360 p.s.i. Green neoprene cover.

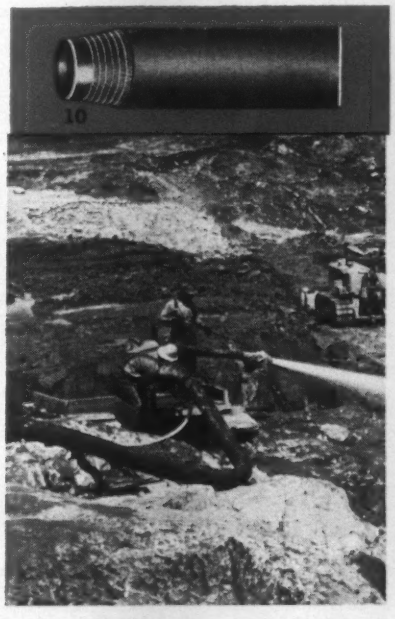
8. SUPER-IRONSIDES. Designed especially for wagon drills and other heavy-duty air drills. All neoprene tube will not swell or flake under hot or oily conditions. In 11 sizes from ½″ to 3″. Has tough, red neoprene cover. Wrapped fabric construction for high burst resistance.

9. VERSICON. Most versatile hose made. Particularly for air-operated tools. Tube will not chip. High-strength rayon reinforcement for highest pressure requirements. Red neoprene cover. Use with water, oil, grease, solvents or sprays. In 22 sizes from 3/16″ to 1½″ in long lengths.



JETTING HOSE for extended service life

10. IRONSIDES JETTING HOSE. An extremely tough, blue cover hose for high-pressure service. Wrapped rubber construction with carcass reinforced with multiple plies of heavy-duty duck and frictioned with high grade rubber compounds Tube is heavy gauge, abrasion-resistant rubber. Resistant to water containing mild acids and alkalies. In long lengths; sizes, 1½″ to 4″.



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11. CONTRACTORS Smooth Bore. For suction use in sewer, foundation, trench and road construction. Constructed with plies of heavy duck and steel wire. Compounded to resist water containing alkalies and acids. Lengths to 50′; sizes to 12″.

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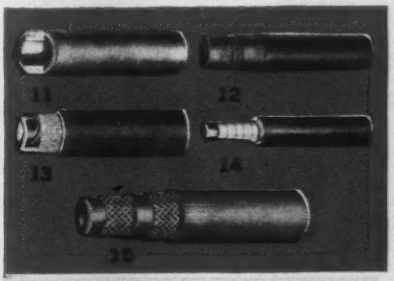
13. VICTOR CL. General purpose hose, heavy-duty suction or discharge service, up to 100 p.s.i. Withstands full vacuum and direct connection to centrifugal and piston pumps. Sizes: 1¼″ to 1½″ with molded cover; 2″ to 4″ with wrapper cover.

14. HERCULES. General discharge service at medium pressures in industry and general construction. Particularly suitable on centrifugal and diaphragm pumps. Lengths to 50′, sizes to 12″.

15. AQUAIR. A dependable, general purpose molded-type hose for medium to heavy-duty use. Very flexible and easy to handle. Available in specified lengths or 500′ reels ¼″ to 1″; 250′ reels 1¼″ to 2½″.



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ENGINEERING NEWS-RECORD

Vol. 167, No. 6 August 10, 1961

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THE CONSTRUCTION WEEK

VERY MUCH ALIVE—Florida's Turnpike Authority expects a construction-start in November on a 156-mile extension of the Sunshine State Parkway. It would run north from the present terminus at Fort Pierce to Ocala, which is about 75 miles directly west of Daytona Beach. A proposed $160-million bond issue must first be cleared by a circuit court and the state supreme court.

BOOM CITY MAY GET BUILDING CODE—Houston, a building-boom city without a building code (ENR July 20, p. 17), may get a rule book by September 1. Raw material has been pulled into code form. By the week of August 26 differences among interested parties may be ironed out.

TO USAF FROM M-K, WITH LOVE—Amid good natured banter about the problems of missile base construction, Morrison-Knudsen Co., and Associates celebrated completion of the first Titan I launching complex last week. The joint venture (M-K, Paul Hardeman, Inc.; Johnson, Drake & Piper, Inc.; Olson Construction Co.; and F. E. Young Construction Co.) is finishing the job on schedule—and at a profit, they say, on their $40.7-million contract.

PEACE-COLUMBIA CONFUSION—The British Columbia government last week threw confusion into the ranks of Columbia-first supporters by taking over Peace River power development as a state enterprise. The government expropriated British Columbia Electric Co. and Peace River Power Development Corp. B. C. handed the Peace project to the new state utility corporation created by the take-over. The move clouds the prospects for Columbia River development in Canada and the Columbia treaty now awaiting ratification by Canada.

IT AIN'T SO—Charges that a recently completed, U.S.-built road in Cambodia is "falling apart" (ENR June 29, p. 20) are grossly exaggerated according to Rep. Frank M. Clark (D., Pa.). Congressman Clark, who has just returned from an inspection tour of the highway, reports that 105 miles of the 130-mile road are in perfect condition, 12 miles need only minor repairs and only 13 miles need major work. He attributes the need for major repairs to floods and to the use of drainage ditches for rice cultivation.

NEVER FIRE A POWDER MONKEY—The sheriff of Lane County, Ore., foiled a plot to blow up a section of road under Jake Coffee, general superintendent for Merritt-Chapman & Scott on the Corps of Engineers' Cougar Dam. An anonymous phone call led to an armed and wired charge big enough to blast an area of road 60 ft in diameter. Revenge for firings apparently motivated the plot, the sheriff said.

THE ARCHITECTS COLLABORATIVE

specified precast white concrete curtain-wall panels for this new Sears store in New England. Anchoring the panels in pairs to a structural concrete frame, an unusual corrugated concrete facade was created. Each unit was precast with a gleaming surface of exposed white quartz aggregate and ATLAS WHITE portland cement . . . 1½ inches of foamed polystyrene insulation . . . and a gray concrete backup. After erection, joints were sealed with gaskets and calking compound. □ More architects are discovering the aesthetic potential of precast concrete in curtain-wall design. Any size, shape, color, texture or pattern can be achieved . . . and economically anchored to any structural frame. For details, consult your local precast concrete manufacturer or write Universal Atlas, 100 Park Avenue, New York 17, New York.

Sears, Roebuck & Co., Saugus, Mass. **Architects:** The Architects Collaborative, Cambridge, Mass. Partner in Charge: Norman Fletcher. **Contractor:** Vappi & Co., Inc., Cambridge. **Concrete Panels:** "Mo-Sai" by Cambridge Cement Stone Co., Allston, Mass.

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WASHINGTON OBSERVER

- **Fallout-shelter survey starts with instruction**
- **Tax-break for equipment buyers still possible**
- **Unions to finance housing for elderly**

- **First stage of the government's fallout-shelter survey is under way.** Some 50 employees, mostly civilian, of the Corps of Engineers and Bureau of Yards and Docks are attending a four-week training session at Fort Belvoir, Va. They will return to their district and division offices to train the private architects and engineers who eventually will conduct the survey (ENR Aug. 3, p. 21). Other similar training sessions are planned until some 11,000 persons are trained in survey needs and techniques. Federal officials hope to complete this phase within two months.

  It is only a matter of weeks before the actual survey will get started. The Corps and the Bureau are proceeding with preliminaries on the assumption that Congress will appropriate the $93 million needed for the job.

  The rationale behind the survey is that this is the quickest way to make available the greatest number of fallout shelters. Pentagon officials told the Senate military appropriations subcommittee last week that the survey may come up with shelters for between 40 million and 60 million Americans. It would be "perfectly absurd," said Defense Secretary Robert S. McNamara, to start from scratch with a $10-billion shelter construction program.

—

- **The 8% tax credit on purchases of machinery and equipment is still alive, despite increased federal spending plans.** President Kennedy sent word to the House Ways and Means Committee, through Treasury Secretary Douglas Dillion, that the tax credit still is essential to the strengthening of the economy for fighting the cold war over the long haul. There is one proviso: Mr. Kennedy will not accept the tax-credit loss ($1.1 billion) unless Congress closes enough tax loopholes to recover most of the money.

  This makes the outlook favorable for House action this year on the tax-credit plan. The big question, however, is whether the Senate can, or will, hold hearings and act before Congress adjourns. Mr. Dillon also told the House committee he sees no need for a tax increase next year—barring, of course, some new crisis that requires more spending.

—

- **Labor unions are launching a $500-million, 10-year program of building specially designed apartments for the elderly.** Projects are planned for some 42 cities, and sites already have been purchased for the first three projects in Miami Beach, Detroit and Seattle.

  Cost savings are expected from simplified designs and from low-interest, long-term government loans. Under the new liberal program of housing for the elderly, interest on government loans is held to the average the government pays—about 3.5%. Maximum maturity is 50 years.

—

- **The Administration has eased another source of housing credit.** Federally chartered savings and loan associations now may make 30-year mortgages covering 90% of the value of a house up to $25,000, and 80% of the value over this to a maximum loan of $26,500. Previously, the maximum loan was $22,000 for 25 years. On a $30,000 home, the old rules required an $8,000 down payment. Now it can be as low as $3,500.

More power–more weight–more tractor!

When you'd rather get the job done by Wednesday afternoon than Friday morning—when you strike heavy gumbo where you'd figured for clay—when you need the extra work capacity of a higher horsepower unit to make out on a bid—that's the place and time to put a "3010" on the job!

All business on one end, simplicity on the other, the self-leveling "3010" Loader is controlled by a single lever for lift arms and bucket. John Deere Backhoes make the most of "3010" power, operate by smooth, rapid two-lever control. Center-mounted and offset models available, digging to 13-1/2 feet—each in a range of bucket sizes.

Machine operators like the clean, open platform of the "3010"—and deluxe, back-supporting seat that adjusts to any man's weight. There's a good view forward, too, with the new, low-profile design.

A 64 engine h.p. gasoline or 69 engine h.p. Diesel unit, the "3010" has power brakes and power steering as standard equipment. Constant-mesh transmission provides eight speeds forward, three reverse.

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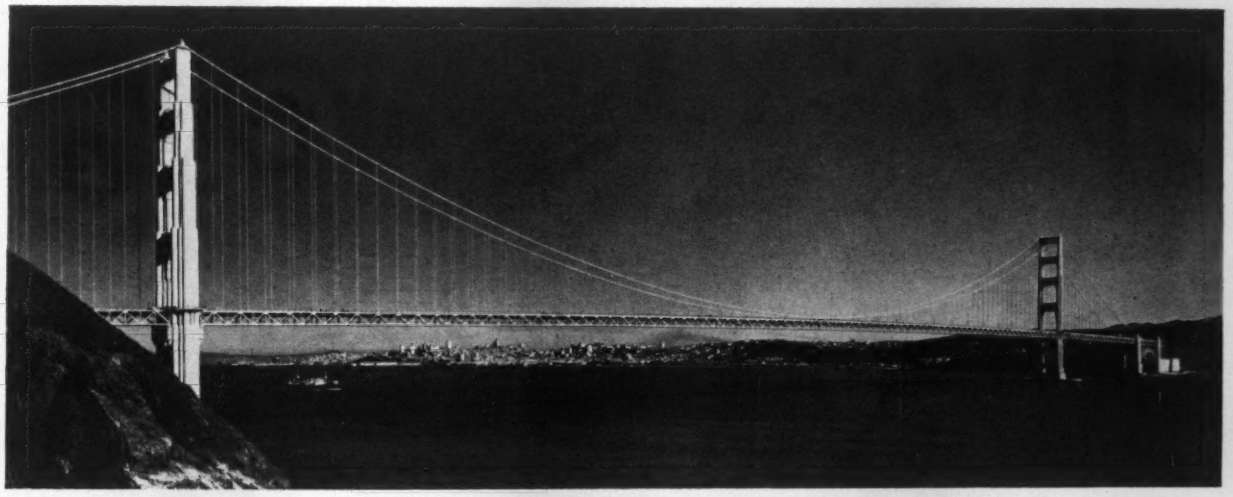
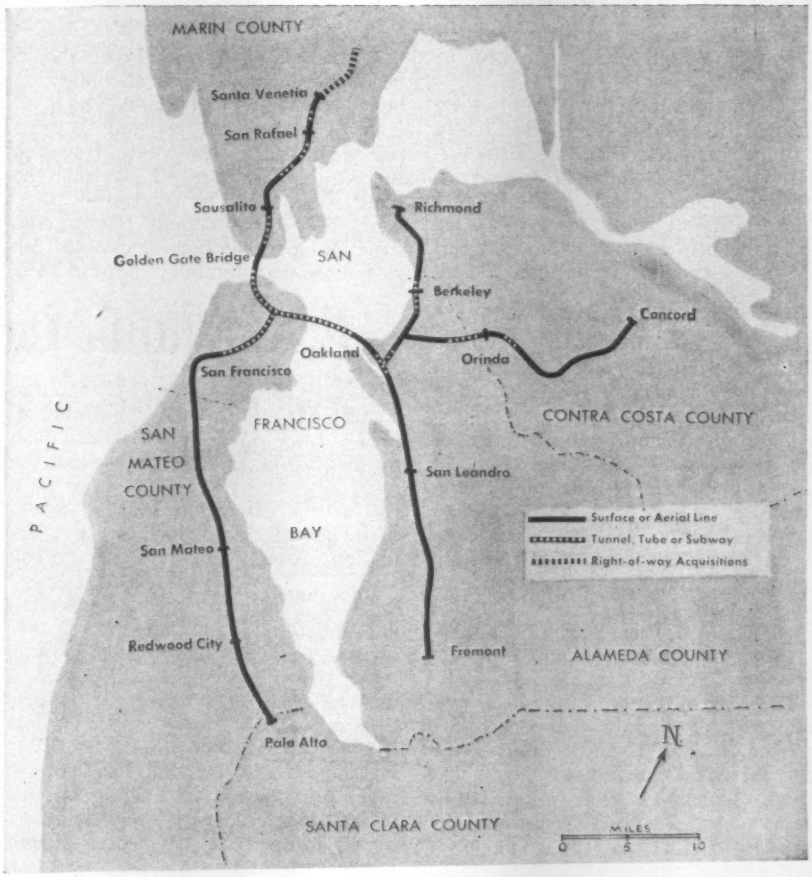


Golden Gate Bridge may obstruct part of a $1-billion rapid transit system but . . .

Bay Area Transit Plans Are Ready



Proposed rapid transit routes for San Francisco Bay area.

Three long-awaited feasibility reports on a proposed billion dollar rapid transit system for California's San Francisco Bay area have been turned over to Bay area transit authorities.

Two of the reports are very encouraging—the third gave authorities a jolt that may well result in some major revisions in existing transit plans.

The financial report and the engineering report submitted late last month to the Bay Area Rapid Transit District (BARTD) indicate, as expected, that the suggested five-legged, 120-mile system is definitely feasible on both counts.

But, the third report—based on a study made for the Board of Directors of the Golden Gate Bridge—virtually rules out the possibility of sending rapid transit trains over the bridge.

This comes as a shock to BARTD representatives whose own survey, completed last March, said the bridge could safely carry rail traffic. The conflicting engineering reports on the capacity of the bridge may well force BARTD to abandon its plans for a 20-mile-long line to Santa Venetia and deprive Marin County of rapid transit.

It may also result in another delay in presenting the needed bond proposal to area voters. The presentation was initially scheduled for last November, but delays in the engineering studies and a conflict with the $1.75-billion California water bond issue postponed the election date.

(Please turn the page)

Subway under Market St.

While the Marin County route is not essential to the system, its exclusion can involve some sticky problems that will take time to iron out. For one thing, the Bay Area Rapid Transit District was set up by the State of California to work out an integrated transport system for an area including San Francisco, San Mateo, Alameda, Contra Costa and Marin counties. Also, any bond issue proposed by the District must be approved in an election by 60% of the voters within the area.

The bridge study that may upset plans for the Marin route was submitted by consulting engineer Clifford E. Paine. Mr. Paine was the chief assistant to the late Joseph B. Strauss in supervising design and construction of the Golden Gate Bridge. Since the bridge was opened to traffic 24 years ago, he has served in a consulting capacity on several occasions. He is said to be more familiar with the engineering aspects of the Golden Gate Bridge than any other person. His specific task was to review a report submitted to BARTD last March by Carl H. Gronquist, a partner of the late D. B. Steinman.

The Gronquist report said that it was feasible to place rapid transit rails on the Golden Gate Bridge beneath the roadway in the bottom lateral system.

Mr. Paine, on the other hand, disputes this conclusion. His primary concern centers around excessive deflections caused by the additional live load. Mr. Paine's calculations indicate that the total deflection from the original dead load position under full live load and at a temperature of 110F would be 18.25 ft at mid-span. This would drop the span 8 ft or more below the required 220-ft clearance above mean higher high water. Mr. Paine concludes that the clearance infringement is not permissible and cannot be remedied.

Although he had other reasons to object to the rapid transit proposal, Mr. Paine contended that the clearance infringement "alone rules out any possibility of carrying rapid transit trains over the Golden Gate Bridge." BARTD may retain a consulting board of several of the world's leading bridge engineers to further review the proposal.

Regardless of the ultimate decision on the Marin route, the favorable engineering and financial reports on the over-all plans have set the stage for positive action by BARTD.

Next step in the program is to submit the plan to the Boards of Supervisors of each of the five counties involved. If all approve, the rapid transit directors can then pass the official resolution submitting the billion-dollar bond issue to the voters. If any county objects to aspects of the program, BARTD will attempt to reach a compromise. If compromise is impossible, that county may have to be left out of the program. Obviously, both San Francisco and Alameda counties are needed. But Marin County, for example, with the prospect of having no rail service may wish to be left out.

The engineering report submitted by Parsons, Brinckerhoff-Tudor-Bechtel (a combine including Parsons, Brinckerhoff, Quade & Douglas of New York and Tudor Engineering Co. and Bechtel Corp., both of San Francisco), covers design details, a construction program and cost estimates. It outlines a 120-mile, two-track system of rail rapid transit connecting the five counties. (The possibility that Marin County would be excluded is not considered in either the financial or the engineering report.)

The routes include some 24 miles of line underground and underwater, 52 miles at grade and 44 miles on elevated structures. It calls for a 10½-year design and construction schedule with engineering design and right-of-way acquisition to start July 1, 1962 and construction to start Jan. 1, 1964. The first elements are to be in operation by July 1, 1968, and the final increment of construction completed by Dec. 31, 1972.

The system centers around a two-mile subway beneath San Francisco's Market St. Rapid transit trains would run on each of two levels below the street. The upper level would handle local transit facilities, relieving the street surface of all rails. The lower level would handle express travel.

Connecting to the west end of the Market St. Subway would be one of the five legs of the system—a 31-mile line through San Mateo County to Palo Alto at the northern end of Santa Clara County. The PBTB report programs this line for early construction and for operation by 1968.

The east end of the Market St. Subway would connect with a trans-bay tube to Oakland. Detailed engineering reports have assured BARTD of the feasibility of the construction of such a crossing even in an earthquake area.

Connecting with the tube in the East Bay is a three-mile Oakland downtown section. This includes as its central part a two-level subway with two tracks on an upper level and one on the lower.

Three routes emanate from the two-level subway. To the north is a 13-mile-long route through Berkeley to Richmond. A southern Alameda County line reaches 23 miles to the south, and directly east of downtown Oakland is a 20-mile-long line that would take the system into the heart of Contra Costa County. This latter line will pierce the Oakland Hills.

The Marin County branch, if constructed, would start with a mile-and-half-long subway under San Francisco's Post St.

According to the financial report submitted by Smith, Barney & Co. of New York:

• **The bulk of the capital costs should be financed through general obligation bonds totaling $1.078 billion.** The bond issue could raise the tax rate 70 cents per $100 assessed valuation. However, the Smith, Barney report says that the bond issue could be successfully marketed over the proposed 10-year construction period, that it would fall within the maximum debt limit of 15%

L.A. Wants U.S.

Officials of Los Angeles Metropolitan Transit Authority went to Washington, D. C., for a $232-million federal loan for 35 years. They returned without the cash, but not without a promise from the state's delegation that it would draft general legislation for a $500-million federal program for urban transit.

MTA hoped for special legislation granting the $232-million loan at 3% interest, to finance Los Angeles' 23-mile rapid transit system. Because such a measure stood little chance of passage, Senators Clair Engle and Thomas Kuchel offered the general legislative measure. Under their bill, local government units would be eligible for low interest federal loans if they have completely planned and engineered a rapid transit system. Los Angeles meets the proposed requirements.

Los Angeles' plans call for construc-

of assessed property valuation, and that the bonds could be amortized over a 40-year period, 10 years less than the legal maximum.

• Construction of a $133-million tube underneath San Francisco Bay connecting San Francisco and Oakland should be financed through surplus automobile tolls on the San Francisco-Oakland Bay Bridge. This follows legislation earmarking such tolls for this purpose if there is favorable passage of a general obligation bond issue for other capital costs of the system.

• Revenues from the system should finance purchase of $149 million in rolling stock as well as paying for all operating and maintenance expenses.

In a search for the best transport methods, engineering consultants Parsons, Brinckerhoff - Tudor - Bechtel studied many propulsion systems. They concluded that rail-mounted, electrically powered, lightweight, remote control units would be best suited. These trains would have a maximum speed of 70 mph and be capable of averaging nearly 50 mph, including stops. The trains would have only one attendant, who could reduce speed or stop the train in case of emergency. All other operations of the system would be controlled by central computers.

The engineering proposal calls for trains to operate at 90-second headways during rush hours and to carry 30,000 passengers per hour in the peak direction of travel. During off-peak hours trains would run at about 15-minute intervals except very late at night.

For regular users, a charge system has been worked out, which involves keyed identification cards and automatic billing. Provision is also planned for cash customers.

Loan for Transit

tion of a so-called "backbone" system to cost about $192 million. The original proposal detailed a 74.9-mile system carrying a $625-million price tag (ENR Dec. 15, 1960, p. 75). Of the total, construction would take about $530 million.

Financing the project through sale of revenue bonds appears impossible, so the MTA took the federal-loan route. The Authority now must await congressional action next year. Then the Kennedy Administration plans to present its proposals for helping cities solve their transportation problems.

In October, however, MTA officials will listen to an offer from a private investment group. Alwac International, through its Alweg Rapid Transit Systems, says it wants to present a firm proposal for financing and construction of a monorail system generally following the backbone route.

Sewer Bids Soar Above Estimates

Low bids much above estimates last week placed San Diego's metropolitan sewerage construction program in jeopardy. Low bids on four of 10 projects in the program came in 30% above a two-month-old revised estimate of $15.3 million. On the basis of original estimates made last year, the bids represented a 45% boost.

Largest job in the three bid—a 13,500-ft ocean outfall with two 1,800-ft diffuser lines—came in at $10,986,000, compared to old and new estimates of $5.9 million and $6.5 million respectively. Bidder was Outfall Constructors, a joint venture including Raymond International Inc. of New York City. Other jobs bid included two interceptor sewers and two pumping stations.

The city planned on outlays of $40.8 million and accepted bids on a $42.5-million bond issue to finance the program. Estimates now place total outlays at $49 million.

Engineering errors contributed to the tangle. David Narver of Los Angeles' Holmes & Narver, concedes the estimates made by his firm in 1960 were low. He adds, however, new estimates were made and the costs were revised upwards.

The original estimates were based on the belief the ocean floor to be penetrated by the outfall was soil. Later tests by the engineering firm revealed a bottom of solid rock. Later cost estimates took the changed working conditions into account.

Dewatering estimates were also low. Mr. Narver attributed the low dewatering estimates to "judgment." A misplaced decimal point at first drew blame for the poor estimate. Mr. Narver denies any arithmetical mistake.

One unanswered question remains, however. The city's contract with Holmes & Narver called for a final construction-cost estimate. But before the estimates were received, the city advertised for both construction and bond bids on the basis of original estimates.

New decisions now face the city. It must ask for another bond issue to cover the new cost, call for new bids hoping they will be lower, or eliminate some phases of the planned program.

Long-Range Airport Aid in Doubt

The House has agreed—and the Senate is expected to in the near future—to extend federal aid for airport construction for five years and to raise the federal contribution from $63 million to $75 million annually.

Although the scope of the program is all but settled, one major issue of crucial importance to airport planners and builders remains to be solved. The House, over the Kennedy Administration's objections, refused to renew the long-range contract authority of the Federal Aviation Agency, which administers the airport aid program.

Under this authority, FAA has the freedom to enter into contracts of more than one year. Since Congress votes appropriations only on a year-to-year basis, the effect of this is to commit the federal government to support an airport project long before FAA has cash in hand to pay for that commitment. Once the bills come due, Congress has little choice but to put up the money.

Opponents argue that this authority amounts to "backdoor spending" and deprives Congress of effective financial control over the airport program. The House agreed. Under its bill, FAA cannot commit the government to spend any more than Congress puts up in cash. However, the bill provides that Congress can make appropriations for more than one year, and even for the entire five-year period, if it desires.

The Administration plans to fight for retention of the long-range contract authority in the Senate. Because planning and building airports requires a long lead time, airport officials insist they need firm long-range commitments of support from the federal government.

The Senate Commerce Committee's airport bill continues the long-range contract authority, and the Senate is expected to sanction the extension when it acts on the bill. If so, the conflict will have to be resolved when a Senate-House conference committee meets to work out differences between the two bills.

Under both House and Senate measures, $49,875,000 annually would go to the states for construction of airports and another $16,625,000 would be available from an FAA discretionary fund. A separate $7-million fund is provided for development of airports for private, business and air-taxi planes to relieve congestion at major commercial airports where scheduled airliners operate.

Most of the federal money would be handed out to the states on a 50-50 matching basis. But grants up to 75% of a project's cost would be available for installing landing aids, such as special lighting systems.

Both bills also provide that no federal funds shall be spent in constructing airport terminals except for features which contribute directly to air safety.

'Cheap' Missile Base Raises Eyebrows

Peter Kiewit Sons' Co. last week won the contract for a Minuteman base at Ellsworth Air Force Base, S. D., with a low bid 16% under the Corps of Engineers' estimate (ENR Aug. 3, p. 15).

Some in construction now wonder if the Omaha-based company also won a money-losing headache.

A few believe the bid realistic and the estimate "loaded." Some major differences between this installation near Rapid City, and the first Minuteman job, at Malmstrom AFB, Great Falls, Mont., also contributed to the sharp cut below estimate. They include: smaller area, longer construction schedules and lots more know-how at this stage of base building.

But Engineer officers grinned when the bids for the Ellsworth AFB complex fell from the envelopes. The Kiewit bid of $56,220,274 contrasted sharply with the estimate of $66,548,147. Even the highest, submitted by H. B. Zachry Co. of San Antonio and Brown & Root Inc. of Houston, came in nearly $3.1 million below estimate.

And on the table between Kiewit's bid and that of the second lowest bidder, Morrison-Knudsen Co. & Associates, lay nearly $2 million. Next was a joint venture sponsored by Utah Construction & Mining Co. of San Francisco with a bid of $59.3 million.

The bid-price difference between the Malmstrom job and the Ellsworth project, however, delivers a stronger punch. The Corps placed the Malstrom cost at $50,816,560; lowest bid hit $78,907,000, the highest—from a Kiewit-sponsored joint venture—soared to $98.5 million. The Pentagon rejected these bids and later negotiated a contract with a joint venture of George A. Fuller Co. of New York City and Del E. Webb Corp. of Phoenix at a cost of $61,773,644.

Signs also point to another basic bid factor—the estimates. The architect-engineers, set Malmstrom's bid low because of an arbitrary ceiling ordered by the government. Later, when the Corps of Engineer Ballistic Missile Construction Office completed its own detailed analysis, it came up with an estimate that was considerably above the A-E's.

On the Ellsworth job, the Pentagon took no chances. To prevent repetition of the Malmstrom embarrassment, the government "threw in everything but the kitchen sink," reliable sources report. When contractors sharpened their pencils for Ellsworth, they exaggerated the difference between their bid price and the fairly generous estimate.

Aside from the estimates, other tangible factors worked for the big spread in both cases.

On Malmstrom, contractors included a large number of contingency items they were unable to price accurately. Subsequent contract negotiations eliminated the contingencies.

Wage rates and fringes and labor availability were relatively unknown quantities. Contractors, therefore, protected themselves against possible difficulties. In addition, responsibility for hauling damage to Montana's roads remained up in the air. Bidders sought protection in high bid prices.

Neither of these question marks appeared over the Ellsworth job.

A skilled labor pool is available since a Titan project is nearing completion there.

Another favorable contributing factor is size. Ellsworth's 150 missile silos and 15 launch control centers will be scattered over an area of roughly 15,000 sq mi. The Malmstrom work area, however, is almost double that.

The government also took advantage of past experience. It handed prospective bidders a "cleaner package" of design, specifications and plans, the result of know-how gained at Malmstrom. Contractors therefore anticipated fewer changes during construction.

CEBMCO also figures that contractors wanted to gain experience at Ellsworth in order to go after the next two Minuteman jobs scheduled. They will be located at Whiteman AFB, Sedalia, Mo., and Minot AFB, Minot, N. D.

West Berlin's construction chief tells ENR he's . . .

Ready for Soviet Blockade

West Berlin—its construction agencies included—is so ready for blockade of its routes to the West that the Soviets probably won't try a blockade again.

That's the opinion of Rolf Schwedler, West Berlin's Senator for Housing and Construction.

Interviewed by ENR in New York City last week, the Senator (West Berlin is both a state and a city) said enough materials and equipment are stockpiled in West Berlin now to sustain its considerable construction activity for six months to a year. He recalled by contrast the June '48-May '49 Berlin blockade, which caught the war-torn city without tools or materials for rebuilding.

Senator Schwedler, 47-year-old engineer with responsibility for all city planning, public works and building inspection in West Berlin, was in the U. S. to open the Berlin Exhibition at the International Trade Fair in Chicago.

Recalling an earlier visit to Chicago, in 1953, he credited it for a change in the planning of West Berlin's expressways: They had been planned for an automobile density of one car for each 10 persons; Mr. Schwedler, not then in charge of construction, was influential in changing the design to be ready for one car for each four persons. As it turned out, the 2¼ million inhabitants of West Berlin already own one car for each 10 of their number. And Senator Schwedler is happy he has six-lane divided expressways instead of four-lane.

All urban highway and rapid transit work done today is based on East-West planning that stopped in 1956, says the Senator. Today in Berlin there is only the minimum East-West construction, required by the fact the East Germans operate the city's elevated rail lines.

Rolf Schwedler
Senator for Housing and Construction

Senator Schwedler cited urban renewal as his big problem, because West Germany suffers from want of a federal law to facilitate acquisition of land for such purposes.

Despite this difficulty, he said, there has been extensive progress in the rebuilding of West Berlin—particularly in the housing field.

(For an on-the-spot report of West Germany's construction boom by ENR Editor Waldo G. Bowman, see p. 32.)

Anthony Chronis, (left) President, Lisle Electric, Inc., Lisle, Ill. talking to Al Jones, his Dodge Representative on a job site.

"Dodge Reports saved our business in its early days ...today, they give us 1/3 of our volume"

"Shortly after I took over this business, we lost an account that represented 50% of our volume," says Mr. Chronis. "We had to round up a corresponding amount in a very short time in order to remain in business at all. We did it through Dodge Reports which we had never used before."

"For the first three months of our subscription," Mr. Chronis explains, "we conducted an intensive promotional campaign based on Dodge leads. It was so successful that after those first three months we had all the business we could handle."

Mr. Chronis began with three men and three trucks, and restricted his contracts to residential construction. "Today," he says, "we have 10 men, five trucks and a trailer. We handle stores, houses and apartment buildings and are beginning to establish our reputation in electrical heating work, engineering and quality custom installations. Last year we completed more than $160,000 worth of contracts, $50,000 of which we picked up solely through Dodge information."

Mr. Chronis goes through each day's Dodge Reports himself, and carries the ones he wants to bid on in his car. When he passes a prospect's site, he says, "I stop the car, walk through the mud and see the contractor on the spot. That's where I can sell our services, because Dodge Reports have told me all I need to know about the job. And, whenever our name appears in Dodge Reports to show that we've been awarded a contract, we feel that it's the best advertising our company can get anywhere."

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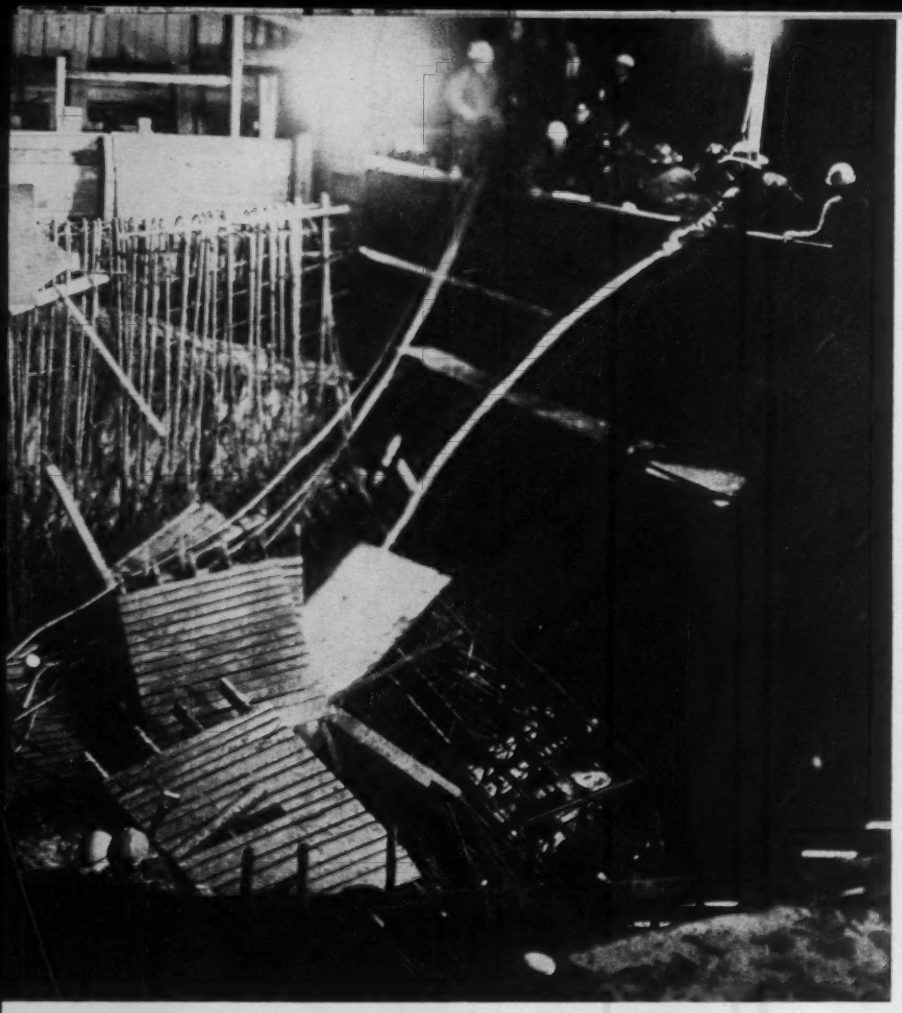


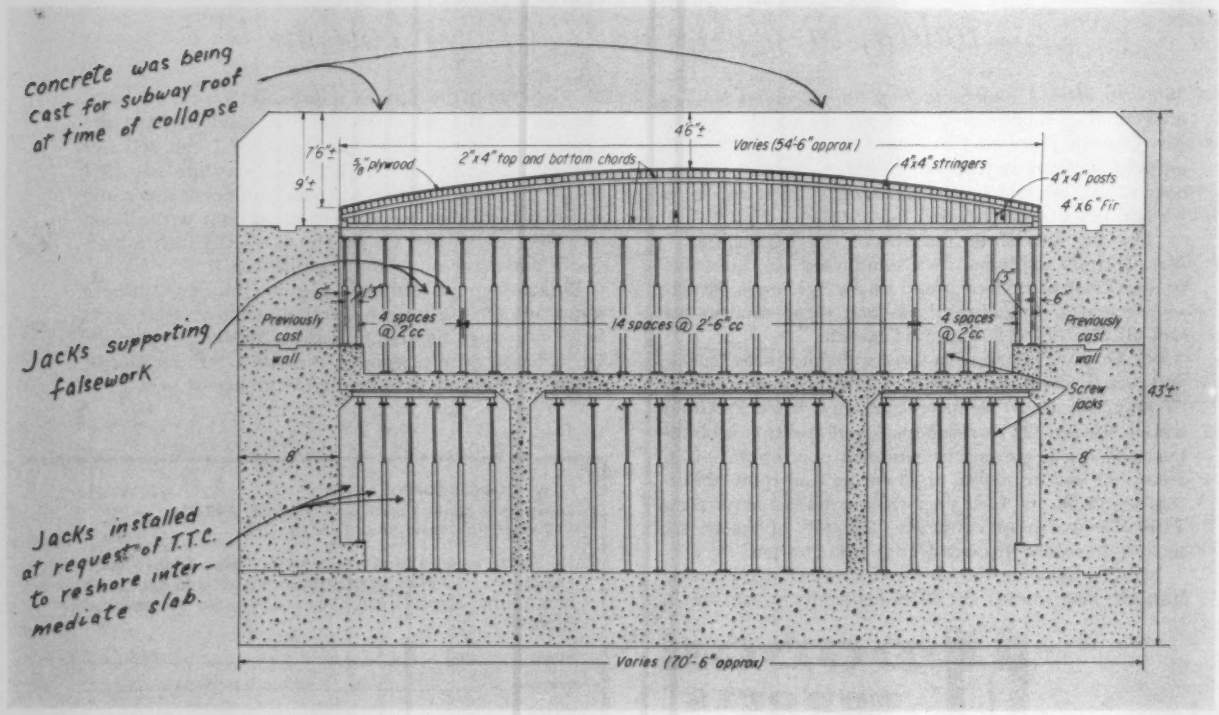
When this subway roof form collapsed on May 26, two men died.

A roof form collapse that killed two men on a Toronto subway construction job on May 26 has been blamed on improper and inadequate bracing and improper installation of form work in a verdict handed down by a five-man coroner's jury.

The jury also charged a contractor, a subcontractor and the Toronto Transit Commission with negligence, and it made a four-point recommendation for preventing accidents of a similar nature.

The jury's recommendations for accident prevention are probably the most significant result of the inquest—particularly since three of the five jurors (a contractor, an architect, and a labor representative) are directly connected with construction. The jury suggests:

- That construction work be handled in accordance with the National Code or municipal codes or by-laws where they exist. (The National Code referred to was issued in 1960 by the Associated Committee on the National Building Code, a segment of the National Research Council, Ottawa. It is not law, but is used as a guide by various provinces and municipalities throughout Canada.)
- That the Metropolitan Building Codes Committee require that all concrete formwork shall be designed by qualified structural engineers to withstand any and all loads to be superimposed and to withstand any and all



TRANSVERSE CROSS SECTION used during inquest shows jack and form arrangement in collapse area.

Collapse Laid to Improper Bracing

vertical or lateral forces to which they might conceivably be subjected.

• That Municipal and Provincial authorities provide an adequate number of experienced inspectors to insure adherence to the codes or by-laws.

• That engineers should continue to examine contractor proposed procedures and temporary work as a means of discovering any design or computation errors, but that such examinations must not relieve the contractor from financial or contractual responsibility while he maintains full freedom of action.

In fixing blame for the accident the jury said:

"From the evidence produced, we find the death of one John Blaney resulted from the lack of adequate bracing, improper bracing and improper installation of formwork." (Under Canadian procedure, in cases involving multiple deaths from a single accident, an inquest is held to determine the circumstances of one death and the findings are held to apply to all deaths concerned —Editor.)

"We feel the form designs as supplied by Frankel Steel Construction Ltd. did not employ sound and practical engineering principles for this particular application.

"The aforementioned does not relieve in any way the general contractor, McNamara-Raymond, from their full responsibility as prime contractor as set out in Section 10703 of the General Specifications of the U-3 Contract.

"The Toronto Transit Commission, as designers of the U-3 Contract, must accept their responsibilities for the proper supervision of the entire contract. We feel they have failed to provide this.

"Therefore we find negligence on the part of all three companies concerned namely: Frankel Steel Construction Ltd. (Toronto), McNamara-Raymond (Toronto) and Toronto Transit Commission."

The jury based its verdict on testimony presented during a nine-day inquest—believed the longest in Canadian history.

More than ninety witnesses, ranging from illiterate immigrant laborers to consulting engineers, paraded to the witness stand. The result was almost as many versions of the accident and its causes.

About the only point on which everyone agreed was that the accident had happened and two men died. With one or two notable exceptions, the major testimony was basically an exercise in finger-pointing—to such an extent that the Queen's Proctor reminded witnesses on several occasions that the inquest was not a battleground for self-interested parties.

A carpenters union representative charged that the use of laborers as well as carpenters for formwork erection was a major cause of the accident. (The ratio was about two laborers for each carpenter.)

Laborers claimed that government safety inspectors didn't do their job properly.

Government inspectors admitted responsibility for general job conditions as pertaining to safety but disclaimed any responsibility for checking on the accuracy of engineering computations or design criteria.

The engineers insisted that the design was right, but that the erection was wrong.

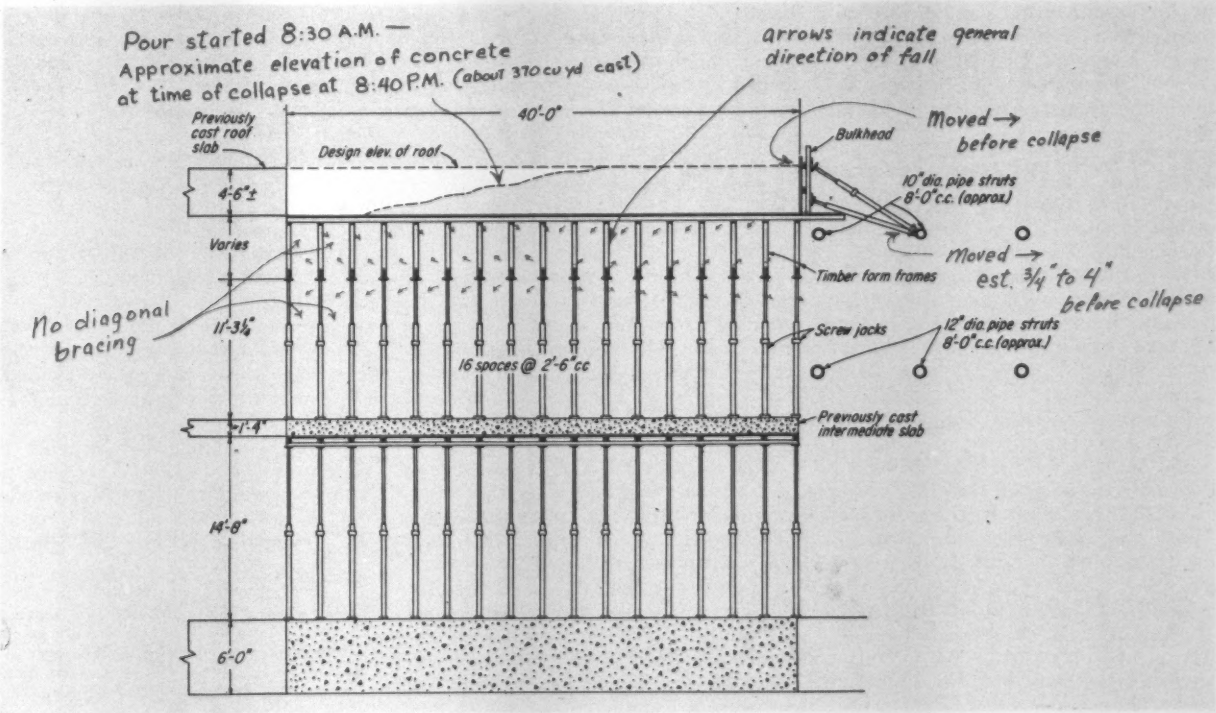
Erectors insisted that the erection was satisfactory, but the method of casting concrete was wrong.

Concrete men said they did everything right and that someone else was at fault.

Several qualified (but interested) men —a few of them graduate engineers— claimed that everything was right and that there was actually no reason for the form to fall down. (Cited were 60 to 70 previous pours made in a like manner without difficulty.)

In spite of the lack of accord on the immediate cause of the collapse, many witnesses agreed that a diagonal bracing system between the roof form frames would have localized the failure even if it could not have prevented it.

One witness said such a bracing sys-



LONGITUDINAL CROSS SECTION at center line includes facts brought out in testimony.

tem would have required four days to install and would have cost in the neighborhood of $600.

Here was the situation: In the collapse area the cut for the subway is about 70 ft wide, 46 ft deep. The sides of the cut are retained by horizontal lagging set inside the flanges of 14-in. WF soldier beams. Opposing beams are braced by 10 and 12-in. dia pipe welded between them across the cut.

The subway is a two-level structure with 8-ft-thick exterior walls. A horizontal intermediate slab that serves as the roof of the lower level and the floor of the upper level is 1 ft 4 in. thick, and is supported by the exterior walls and two intermediate walls that divide the lower level of the subway into three separate tubes.

The roof of the upper level is an arched span, about 8 ft thick at the walls, about 4 ft thick at the center. It was the collapse of the formwork for a 40-ft-long section of this roof that cascaded about 370 cu yd of concrete and 27 tons of reinforcing steel into the tunnel below, killing the two men.

Before work began on the ill-fated roof section, the contractor had cast the entire lower level and had brought the exterior walls up to bottom elevation of the roof slab.

The face of the roof slab form was of $\frac{5}{8}$ in. plywood. It rested on 4 x 4 stringers and transverse frames made of 4 x 4 timbers set vertically between top and bottom chords of 2 x 4s. These were supported by 4 x 6 timbers that in turn were supported by screw jacks set on the intermediate slab at intervals ranging from 1 ft 3 in. to 2 ft 6 in. (In the interest of safety, the TTC had ordered the contractor to set jacks beneath the intermediate slab at points corresponding to the location of the jacks above. This was done.)

However, in neither the formwork drawings made by Frankel and approved by the TCC after being seen by McNamara-Raymond, nor in the initial construction, was any provision made for diagonal bracing either within the formwork frames or between them. Thus when the casting of roof concrete began, the frames were not trusses, and were not braced against longitudinal movement.

In the words of Edgar Cross, Toronto consultant, one of the few independent and unbiased experts to testify at the inquest: "There was not a scrap of bridging between the trusses, and anyone knows that even in house-building, there must be."

Mr. Cross suggested that the failure started with the movement of the bulkhead at the east side of the pour. This bulkhead, which rested on the outside edge of the roof form, was braced diagonally to the upper strut between the soldier beams—and according to testimony of several witnesses, including Mr. Cross, the pipe was not strong enough to take the lateral thrust. Mr. Cross said that under the pressure of the bulkhead, the pipe would deflect up to 4 in. and permit the bulkhead itself to move.

"It is my opinion that the bulkhead moved," he said, "it moved at 11 am, 4 pm and 7 pm. The form moved with it and something got loose. There was nothing to prevent the jacks from moving. . . . What actually happened at the point of collapse none of us can tell.

"It's the old story—lack of lateral bracing," he said. He has files on 70 collapses, he said, and in his opinion about one-third of these collapses were caused by lack of understanding of how to brace a structure.

BPR Vetoes Freeway Grass Roof

Seattle civic groups and architects campaigning for a park to cover a depressed freeway that will run through the city's northern business district lost their battle, apparently, when Federal Highway Administrator Rex Whitton sided with the State Highway Commission.

Property owners in the First Hill district complained that the freeway would be a big ditch that would cut their neighborhood off from the central business district. City Engineer Roy W. Morse proposed to cover five blocks of the freeway with a park (ENR May 4, p. 26).

The state highway group disapproved of the plan, but forwarded it to the Bureau of Public Roads. Mr. Whitton rejected the plan for the $7-million cover. He said it "would result in substantial reduction in the safety, efficiency of operation and capacity of the facility."

Mr. Whitton further advised that the highway code does not permit expending federal-aid highway funds to create parks. He told city officials, however, that the city could cover the freeway later, if it paid all costs and got approval from the State Highway Department.

The state's two senators now are exploring the possibility of getting funds from some other federal source for the cover project. Further work on design and construction of the affected portions of the freeway will be delayed until the city decides whether it wants to finance all the costs and, if so, whether construction will be concurrent with construction of the freeway or after the freeway is completed, in about four years.

ICBM Strikes Drop

Stoppages hit record low but many problems remain

Labor stoppages at the nation's 21 missile and space sites reached an all-time low last month with only 209 man-days of work lost to labor disputes. Release of the record figures coincided with a two-day tour of four major missile bases conducted by Labor Secretary Arthur Goldberg and other members of the Missile Sites Labor Commission set up to handle labor troubles on the bases.

The tour, which included officials of the Air Force as well as manufacturers, contractors and labor leaders involved in missile making, covered sites at Cape Canaveral, Fla.; Vandenberg Air Force Base, Calif. and Mountain Home Air Force Base, Idaho. A fourth stop was the Strategic Air Command Headquarters in Omaha.

Despite the July record figures, the problems—jurisdictional disputes, contract differences and working difficulties—are still present at the missile sites. Workers complained to Mr. Goldberg and other Commission members on some of the issues and were advised these would be taken up either by the Commission or by the local missile committees established at the missile bases.

The Labor Secretary emphasized that the missile labor program now operates to handle such disputes, and that work stoppages are both "unnecessary and unwarranted." He bluntly warned missile site workers that if stoppages continue in any sizable number the Administration will seek legislation to outlaw missile strikes.

Secretary Goldberg noted there is a "great deal of justifiable criticism" of the labor missile situation, but said the tour also showed "there is dedicated work done at all levels, under difficult circumstances" at the bases.

The Commission members were impressed by such job problems as isolation of the missile bases that requires extensive travel time on the part of some employees, as well as the extensive skills and dangerous assignments demanded of contractor and manufacturing employees.

Besides handling labor disputes, the Commission is faced with devising pay formulas covering such work in an effort to end "uneconomical practices" in missile labor contracts (ENR Aug. 3, p. 63).

ENR's Index of Editorial Content for January-June 1961 has been mailed to those on the Index mailing list. If you wish your name added, please write to: Indexing Dept, Engineering New-Record, 330 West 42nd St., New York 36, N. Y.

The Motor City's New Convention Facility Stands On RAYMOND Foundations

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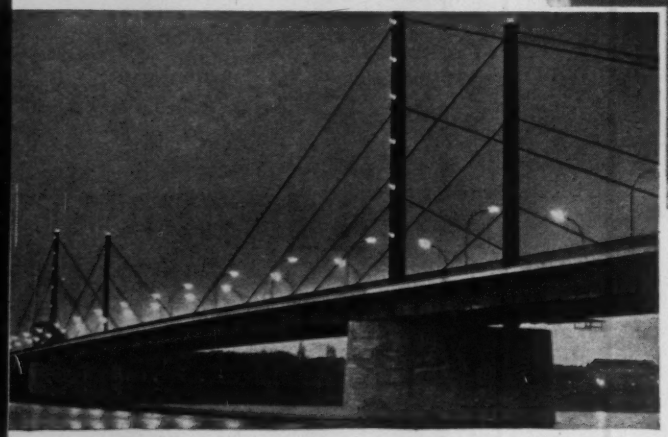
West Germany: Where

Hochhäuser Tall buildings, like Phoenix-Reinrohr, are in demand, because of high real estate prices, prestige value.

Autobahnen Expressways, like Frankfurt-Nurnberg, get top priority in a $15-billion, 12-year roadbuilding program.



Grosse Brücken Large bridges, like the stayed-girder North Bridge over the Rhine at Dusseldorf often show advanced design techniques.

Construction Is Booming

By Waldo G. Bowman

If you look hard enough you can still find examples of unrepaired war damage in West Germany. But they are largely confined to facilities unrelated to economic recovery—museums, churches and the like.

What the traveler in West Germany today sees with ease—from the upper Rhine industrial area northward to the Ruhr on the west and from Hannover southward to Frankfurt, Stuttgart and Munich on the east—is one vast construction project. Everywhere, the fresh, new and orderly look of finished facilities vies for attention with the derricks, tractors, trucks and other wonderful and cluttering paraphernalia of jobs still under way.

What the traveler will sense, if he talks with West German engineers and construction men, is that the objective is not just to replace what was destroyed, but to build anew. Precedents are set, not followed. Past practices are discarded in favor of new methods. A definite spirit of inventiveness prevails.

Three types of facilities dominate the German construction scene—tall buildings, modern expressways and large bridges. These Hochhauser, Autobahnen and grosse Brucken have altered the country's landscapes and skylines in unbelievable fashion. Rising Phoenix-like from the ashes of bombed and burned out structures, they epitomize, even better than economic statistics, the decade of resurgence that has made West Germany one of the world's most prosperous countries.

• **Striking statistics**—Industrial production is 2½ times what it was ten years ago; it rose a respectable 10% last year. Unemployment, with a powerful assist from the construction boom, is practically non-existent. Not only has continuous immigration from Communist East Germany (now stepped up because of the latest Berlin crisis) been absorbed in the labor force, but common labor must still be imported from Italy and Spain.

Total construction expenditures last year were $9.4 billion, up from $6.99 billion the year before. All classes of construction participated. Largest relative gain was registered by industrial construction, 53%, but housing accounted for the largest expenditure, $4.15 billion.

This large housing total is worth noting because it represents 575,000 completed dwelling units. The U. S., on the basis of its larger population, would have to produce 2.2 million housing units, or twice as many as we actually produced to equal this record. And since Germany produced 590,000 housing units in 1959, and is well on the way to repeat this record for 1961, our similar three-year totals would be equally far behind.

• **Political undertones**—This physical well being of West Germany, as expressed by its new construction, is also more than economically important: It is a political phenomen of major significance. When Mr. Khrushchev says he wants the Berlin question settled, he is really fishing for some sort of an arrangement by which his satellite, East Germany, can share in this rebuilding boom. The contrast between vibrant, rebuilt West Berlin and drab, down-at-the-heels East Berlin is a blot on the Soviet escutcheon that Mr. Khrushchev wants to erase.

Obviously, a united Germany would be a logical solution. But this poses a dilemma for the Soviets, who want a Communist dominated Germany, whereas the prosperity of West Germany is a direct result of free, private enterprise. Signing a separate peace treaty with East Germany, which is Mr. Khrushchev's threat, would seem to foreclose any chance of compromise and dash his hopes for Hochhauser, Autobahnen and grosse Brucken for his satellite. It is doubtful if he is ready for that move yet. If he isn't, the West German construction boom can be credited with staying his hand. And while he lives in hope that something will turn up that will permit him to have his cake and eat it too, the world can continue its uneasy peace.

It is not, however, with these sober political undertones of the West German construction boom that this report is primarily concerned. Rather, it is with the technical developments and the building achievements that the boom has engendered. And a convenient place to talk is with the Hochhauser, the tall buildings.

I. Tall Buildings

German industry turns more and more toward the skyscraper-headquarters building as a means of overcoming a dire shortage of real estate. Before the war, an office building of over six stories was a rarity, but today administrative buildings up to 20 stories or more are mushrooming in West Germany's major cities and industrial centers. The basic reason is that real estate prices have risen to such an extent that a 6-floor office building on a piece of downtown property costing $1 million would be false economy.

Prestige also plays a significant role in many of the decisions to build higher. Volkswagen, for example, way out in the country at Wolfsburg, with ample real estate available at far from exorbitant prices, put up a 15-story building to keep in the prestige swing. Prestige, too, caused the Henniger brewery in Frankfurt to shelve a design for a low, large diameter grain silo of normal type in favor of a looming 330-ft high tower-type silo topped off with a rotating restaurant.

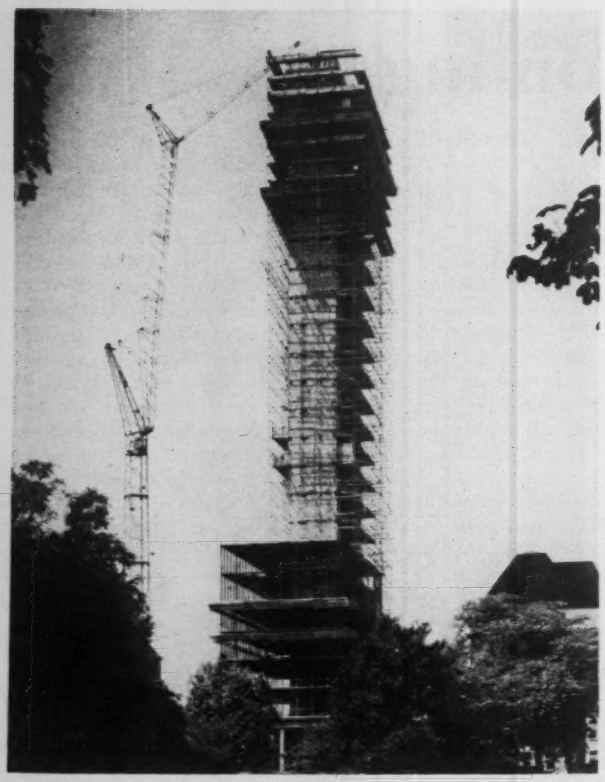
The great Ruhr city of Dusseldorf, however, probably offers the best examples of tall buildings engendered by a combination of the real estate and prestige factors. Europe's two largest manufacturers of steel pipe own the two tallest buildings. The Mannesmann company building, completed first, is 24 stories, so the Phoenix-Rheinrohr company made its headquarters building 26 stories. The respective heights are 290 and 311 ft.

• **Sophisticated structures**—Both of these buildings incorporate unusual structural arrangements. Mannesmann has a reinforced concrete core, which acts not only as an elevator and utility shaft, but as a rigid "backbone" to which all lateral loads from the surrounding structural steel frame are transmitted. Columns are tubular, 18 in. in diameter in the bottom story, and all column-girder connections are hinged to eliminate bending and torsion in the columns.

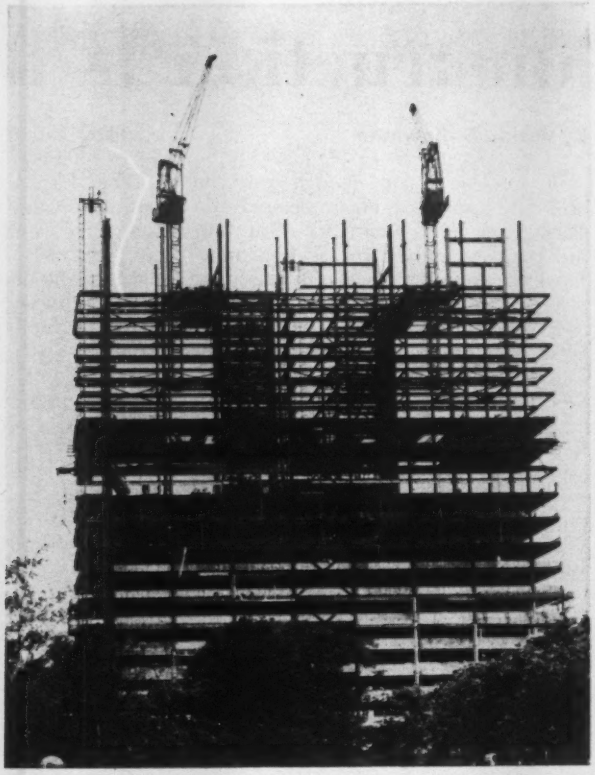
The Phoenix-Rheinrohr building has the form of three narrow up-ended slabs, 6 ft apart. The center portion is the longest and tallest, and is, in appearance, propped up by the portions on either side. Actually, there are two transverse and two longitudinal structural systems. Two vertical trusses at the ends of the shorter towers and extending into the center tower take the wind loads. Floors, designed for composite action, transmit horizontal shear to the trusses, which act as vertical cantilevers.

Tubular steel columns are used, varying from 16½ in. in diameter with a 1¼-in. wall thickness at ground level to

*ENR's Editor **Waldo G. Bowman** is just back from Europe where his first attention was centered on West Germany and its construction boom.*



MANNESMANN BUILDING, Dusseldorf, has concrete core inside steel frame that features pipe columns.



ERECTION CRANES on self-elevating towers lift steel for tall headquarters building of Bayer Chemical Co. near Cologne.

7½ in. in diameter and wall thickness of ⅜ in. at the top. This building is not only taller than the Mannesmann building, but it is much larger in floor area—360,400 sq ft compared with 142,000 sq ft. At $7.5 million, it also cost three times as much.

So far the skyscraper trend has been limited to office buildings. German architects and builders do not foresee that it will be repeated in apartments, although it may be in hotels. Nevertheless, housing developments up to 10 stories have been proposed, and 8-story ones have been built. Before World War II there was a 4-story maximum.

• **Prefab parts popular**—Though German contractors are using more prefabricated parts for their buildings—large exterior wall and partition sections, for example—these parts, until recently, were of French, British or Swedish origin. The first building with German designed and manufactured prefab parts is a combined office and apartment block in Wolfsburg. The floors of this 9-story building were assembled from 590 precast concrete slabs, the largest of which weighed 9 tons. The windows and doors of this building were also prefabricated in their frames and painted and varnished at the factory, ready for installation.

Prestressed concrete is most widely used in bridges, but it has occasionally found application in an industrial building. An example is the foundation for a continuous wide-strip mill at Duisburg where possible ground settlement (as a result of coal mining) had to be compensated for. A prestressed slab, 119 x 79 ft in area, supported on three footings, was built. Built-in hydraulic jacks at these footings permit leveling the 14,000-ton load of slab and steel mill. A total of 534 prestressing wires with a combined length of 10 miles was required.

II. Autobahns

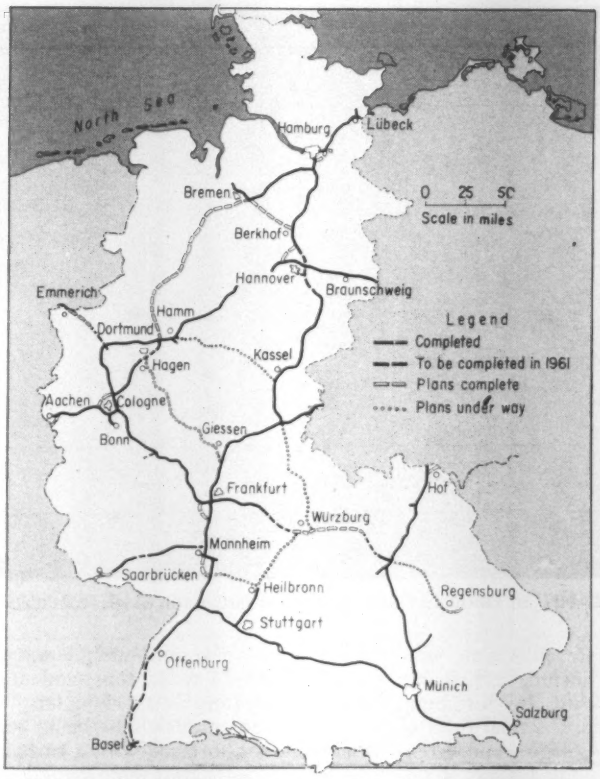
Ten years ago Western Germany had one car for every fifteen persons. Today the ratio is 1 to 11 on the basis of a larger population. Another way to look at it is that five years after the war less than 1 million motor vehicles were registered. There are now over 8 million. This gives a traffic density per mile considerably larger than in the U. S. and exceeded only by Belgium. It is not surprising, therefore, that road-building has played a prominent role in the country's construction boom.

To cope with the problem legislation has been passed to allow the Transport Ministry to earmark nearly all of the yield from motor fuel taxes ($700 million) for road construction. Over a 12-year period West Germany now plans to spend about $15 billion. About half of this will come from the federal government and the remainder from cities and local authorities.

It is estimated that $6 billion will go for city and town roads, $5¼ billion for autobahns and federal highways and the remainder for secondary rural roads. Western Germany spent $4 billion on all of its roads during the ten-year period from 1949 to 1958. In only four years, from 1959 to 1963, it will have spent more than $5 billion.

• **Highway program**—By 1971—when the 12-year program ends—Ministry of Transport planners hope to have constructed 1,230 miles of new autobahns, 650 miles of federal highways, 2,450 miles of by-pass highways (around villages) and 320 miles of secondary roads. In addition, the program calls for 850 miles of so-called "tourist" roads, which lead to mountain and seashore vacation spots. During the 12-year period too, it is estimated that some 5,000 miles of old autobahns and federal highways will be rehabilitated and modernized.

The German autobahn is a divided expressway with entrances and exits quite far apart, as distinct from the main federal highways, which are now also beginning to be of divided type. In the last five years, 240 miles of new autobahns have been completed and 300 miles are now under construction. All this work will be finished by the end



AUTOBAHN construction program will produce 1,230 miles by 1971. Some 300 miles are now under construction.

ON NEW AUTOBAHN, Frankfurt to Nurnberg, motorists will drive between broad white lines.

of this year, and the plan is to complete about 100 miles each year.

Top priority goes to autobahn construction because this type of road best serves the country's extensive long distance traffic and is vitally needed as a part of the European highway network. By late 1963, motorists entering from any of the neighboring countries will be able to cross Germany in any direction on autobahns at speeds of 75 mph or more.

• **Consultants vs. government staff**—As in the U.S., the factor limiting fast progress on autobahn construction is right-of-way acquisition. It is costly and time consuming. But another difficulty arises from lack of enough engineers in the government to get plans fast enough. The solution has been to use private consulting engineers, but government officials complain that too many of these firms are new and inexperienced. The consultants argue against this generalization. They claim they can turn out designs more cheaply than a government department with its large overhead.

The bureaucracy-consultant argument applies only to the roads and run-of-the-mill bridges. For the larger structures, consultants are invariably used, or design competitions are held in which both consultants and contractors who have engineering staffs of their own take part.

On the really big bridge jobs the competitors are picked and limited to about ten in number, each of whom is paid a design fee to cover his bidding expense. The design that is chosen, of course, carries with it a much larger fee for the further refinements that are necessary. And if a contractor wins the competition he also benefits from the construction work.

The same system is used for smaller bridges, but with bidders unlimited in number and no design fee paid except to the successful bidder. German consultants and contractors are convinced that more advances can be made in structural engineering by such competitions than by the U.S. system in which all contractors bid on one design. It is undoubtedly true that a large number of original designs have appeared and a number of unusual structures have been built in Germany under this system since the war.

The total cost per mile of the German autobahns varies widely as would be expected. In open country with few bridges, it has been as little as $312,000. (Interestingly enough, rehabilitation of similar pre-war autobahn sections, on which a large program is underway, costs about $400,000 a mile.) Other new sections of autobahns involving long lengths of elevated structure, as in the Ruhr industrial area, are under construction at a cost of more than $3 million a mile. And the most expensive section to date is the Berlin ring autobahn nearly $8 million a mile.

• **Paving practices**—Prior to the war, most of these highways constructed in Germany had concrete pavement. Now only 40% are being built with concrete, and 60% with asphalt or tar. Both types of pavement are placed on a base of gravel mixed with tar or bitumen. Usually tar is used where the existing foundation is a gravel permitting mixing in place. Where the gravel has to be brought in it is coated with bitumen in a mixer. The latter is the prevailing practice since soil types are generally not suitable for in-place mixing. Much of the gravel has to be crushed to provide it with angular surfaces for good binding quality; in these instances, however, specifications permit rounded surfaces up to 30% of the total.

For rigid pavement, concrete slabs 9 in. thick, with about 5 lb of reinforcing steel per sq yd, are placed on a 6-in stabilized gravel base over a frost layer of plain gravel. For flexible pavement, the bottom 6-in. gravel layer is often stabilized with cement. This is then covered with 7 in. of bitumen-stabilized gravel placed in three layers and compacted. The actual pavement is a 2-in. binder of asphalt covered by a 3-in. wearing surface.

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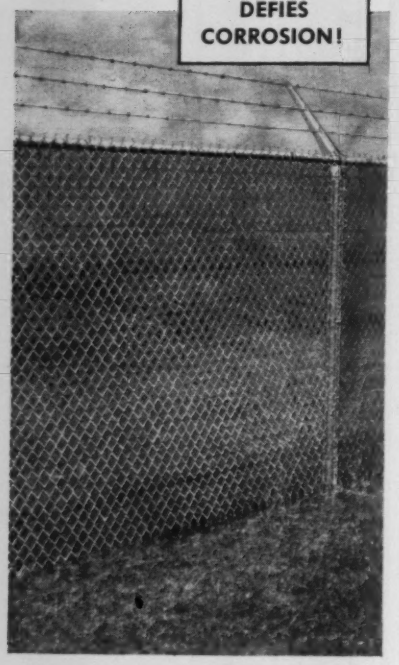

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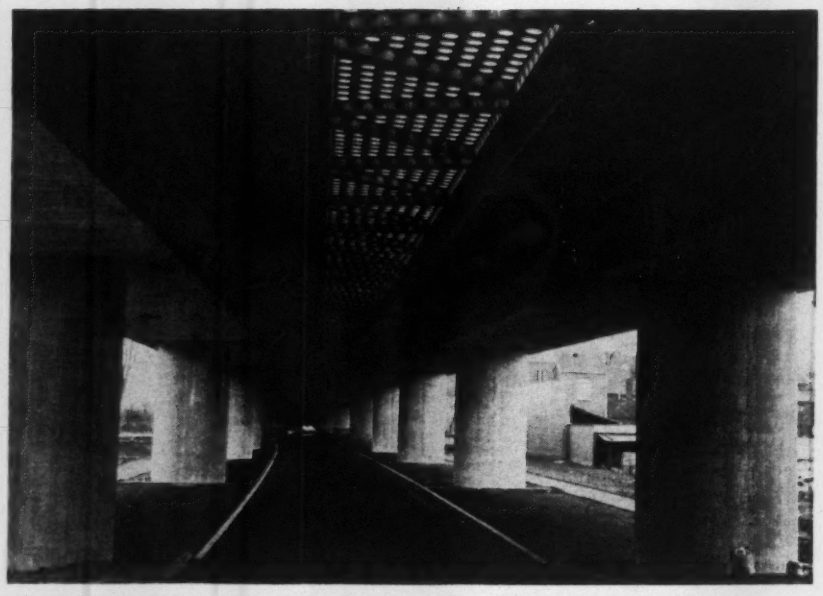


ELEVATED AUTOBAHN in Dusseldorf uses prestressed girders on single columns.

The principal new autobahns now under construction include a 120-mile stretch from Frankfurt to Nurnberg, about half completed; the final third of a ring road around Cologne, and extension of the 60-mile-long system of circumferential and cross-city expressways at Berlin. Except for the Cologne and Berlin rings, German autobahns provide for two lanes in each direction on 28-ft-wide roadways.

Three-lane roadways are being built into Cologne, and an additional lane is being added to the old two-lane Cologne-Dusseldorf autobahn for a distance of about 10 miles out of Cologne. These, and some in Berlin, will be the only autobahns with three lanes in both directions in Germany, with the exception of stretches where a slow-truck lane has been added on hills. Many German highway engineers believe that a mistake is being made in building any more two-lane autobahns.

Actually, except for the elevated sections, autobahn right-of-way is usually wide enough for three lanes in either direction. The width of cross section of the present two-lane type is 95 ft, made up of the two 28-ft roadways, a 13-ft center strip, 8-ft parking strips at either side and 5-ft paved shoulders.

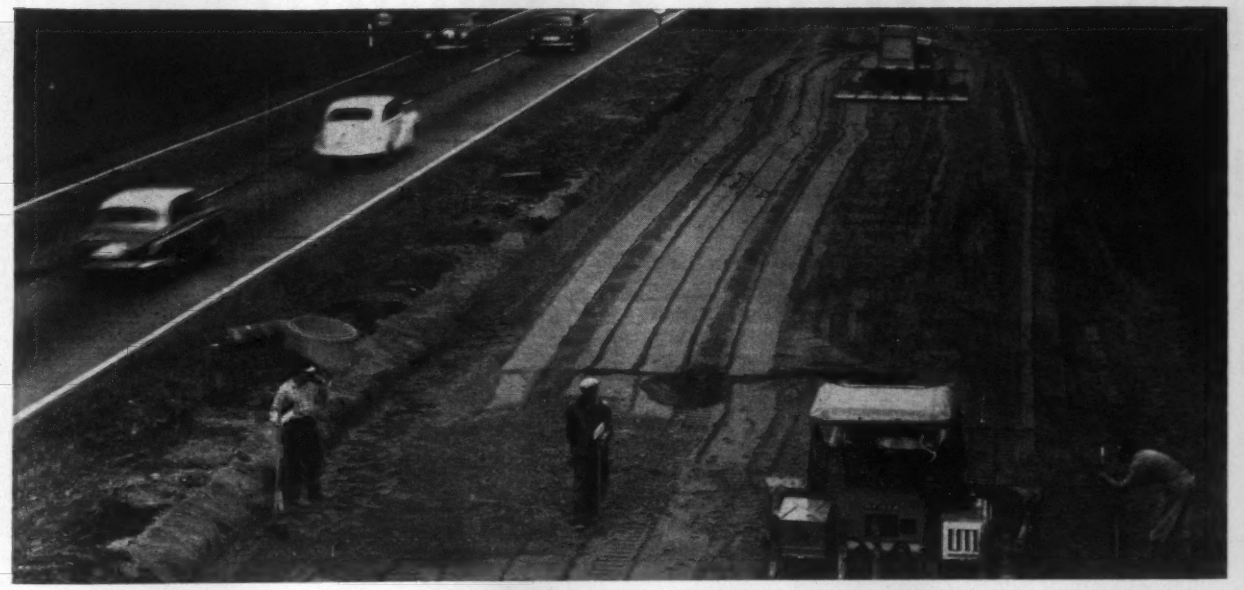
All these new roads are being designed for heavier loads than formerly as a result of conclusions drawn from a test program similar to our AASHO road tests. Both 8-ton trucks, as permitted formerly, and 10-ton trucks were used. The heavier trucks did no more damage than the lighter ones. Therefore the Ministry of Transport a year ago established new vehicle requirements. The maximum load on the driving axle was increased from 8 to 10 tons, with 4 and 6 tons permitted on other axles; maximum weight was increased from 24 to 32 tons; and maximum length from 14 to 18 meters.

While new autobahns are being built, Germany is also faced with a huge job of replacement and improvement on the autobahns built before the war. Eventually all of this pavement must be replaced.

As one drives about Germany, road rebuilding is frequently encountered. Timed traffic signals warn that one roadway is closed, and that two-way traffic is required on the other roadway. On the side being repaired all the old pavement is broken up and removed. The subgrade is then dug out to a depth of about a yard, and a new stabilized subgrade built up and compacted.

On some of the jobs the new pavement is being constructed in place, but in many instances precast prestressed slabs are being installed. These are made at a convenient roadside plant and trucked to the job. They are placed by a small crane, and vibrated into firm contact with the subgrade by a roller. The joints are pressure grouted, and sometimes holes are left in the slab for this purpose. This precast slab method is also extensively used to replace small sections of damaged pavement.

• **Prestressed pavement**—Highway engineers show much interest in prestressed pavement, but only one road section, near Bingen, has been built as an experiment. The slab is 6 in. thick, compared with the normal 9 in. On the other hand, a 11,400-ft-long runway, 180 ft wide, has been completed in prestressed concrete for the Cologne-Bonn International Airport, and the Volkswagen company has built a mile-long, banked track for test-driving its



RECONSTRUCTION is scheduled for 5,000 miles of old autobahns and federal highways. Builders improve one roadway at a time.

automobiles at its Wolfsburg factory.

These successful examples of prestressed pavements encourage German highway engineers in their belief that further research on prestressed road pavement will pay dividends. But in this and in other areas of road research they are stymied by a lack of funds. There is hope that some of the new tax money can be used in this essential work, and recently the Ministry of Transport and the semi-private Federal Highway Research Association (something like a combination of the Portland Cement Association and the Asphalt Institute) have established a joint research program. It will cover photogrammetry, use of electronic computers, graphical analysis methods, safe vertical and horizontal alignments and the like, as well as pavement design.

III. Large Bridges

Except in a few details, German autobahn practice is not essentially different nor as far advanced as similar work in the U. S. In the field of large bridges, however, there are some major differences and some types of structures that we have not yet tried. One of these is the long-span steel girder bridge in which the girders get partial support from inclined cables attached to and balanced about towers or columns rising above the bridge at the piers. These bridges have a certain resemblance to a suspension bridge, but they are definitely not of this type.

The Germans have not yet settled on a simple name for this type structure although it is sometimes referred to as a "stayed-girder" bridge. Before the war there was a similar structure, called a "bridle-chord" bridge, across the Rhine at Krefeld, but it had vertical suspenders between its single inclined cable and the girders. The new bridges have no vertical suspenders, and they use several inclined cables.

• **Ingenious engineering** – The first bridge of this type to be built was the Nordbrucke over the Rhine at Dusseldorf. It has a center span of 858 ft and side spans of 355 ft. From 110-ft-high columns over the piers three lines of inclined cables or stays, reach out, from three different elevations on the columns, to connections on the girders both in the main and side spans. The girders are welded boxes 11 ft deep and 5.25 ft wide.

The latest bridge of this stayed-girder type is the Severinsbrucke over the Rhine at Cologne, which introduces some interesting variations. Instead of having two piers in the river as at Dusseldorf, from which the stay-cable columns rise, the Cologne structure uses only one pier, and it is located off center near one bank of the river. Moreover, the stay-cable columns over this pier are joined into an A-frame tower, and all of the stays are attached at the peak of this frame instead of at several different elevations. Despite these substantial variations, however, the two bridges are of the same type.

Both of these bridges exhibit another German innovation – the orthotropic plate deck. This is a relatively thin steel sheet stiffened by multidirectional corrugations. The deck is rigidly connected to the main girders and floorbeams by welding. It thus becomes a part of the load-carrying cross section of the bridge (in effect, the top chord of a box girder) and eliminates the necessity of longitudinal stringers. A 3-in. layer of asphalt paving provides the roadway surface.

The use of orthotropic plate designs, in combination with welded box section girders, has permitted remarkable savings in steel in a large number of German bridges, both of free-span and stay-cable supported types, and even in a conventional suspension bridge. The latter is the Cologne-Mulheim bridge over the Rhine. Originally built (in 1927) as a self-anchored suspension bridge, it required nearly 13,000 tons of steel. Destroyed in the war, it was replaced, using the same piers, with an anchored-type suspension bridge equipped with an orthotropic deck, and the steel required was only 6,000 tons.

Wide use is made in Germany, too, of composite decks (they have also been used in buildings) in which a concrete slab is made to act integrally with its steel supports. Dowels, spirals or shallow trusses join the steel to the concrete and in one design the bond for shear resistance is obtained with a rich mortar.

One interesting use of a composite deck (and in this case it was also prestressed) is on a bridge at Wuppertal where it forms the top chord of a trough-shaped trapezoidal truss or space frame. Another significant application is on the Rodenkirchen suspension bridge just upstream from Cologne. When originally built in 1941, this bridge with a main span of 1,250 ft required 3,000 tons of wire rope for cables and 6,000 tons of structural steel. As rebuilt after the war, using a composite concrete deck, high strength bolts and modern design methods, a saving of 600 tons was made in the cables and 2,800 tons in the structural steel.

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• **Prestressing in bridges** – Prestressed concrete is widely used in Germany, particularly on the elevated sections of the autobahns, and in a few cases in unusually long spans over rivers and valleys. Usually, these bridges are concrete box sections supported on single, large-diameter piers. And two bridges are placed side by side, each carrying two lanes of traffic.

A typical example is in an elevated section of autobahn at Dusseldorf. Here, the box section is 15.4 ft wide and 3.7 ft deep. The top of the box is cantilevered either side to give a total width sufficient for a 28-ft roadway and a 3-ft sidewalk. The boxes rest on piers 9 ft in diameter. Prestressing of the boxes is usually done in sections about 35 ft long, each section cantilevered from the one previously prestressed, and without the use of falsework.

Separating the bridges for opposing traffic provides the space for a central dividing strip. On the structure at Dusseldorf, this space was covered with a perforated concrete slab to permit light to shine through, since the area beneath will be used for parking.

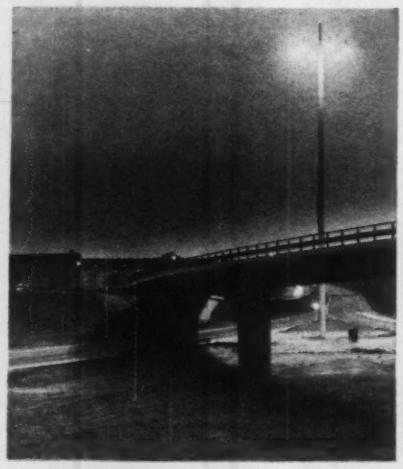
Prestressing recently reached record proportions in Germany when a hollow girder span with the remarkable length of 462 ft was completed. This is in a bridge over the Main River on the new Frankfurt-Nurnberg autobahn at Bettingen. Actually, this central span is part of a continuous, three-span layout in which the side spans have the respectable length of 285 ft.

Lengthwise, the Bettingen bridge is two separate structures although the separation is only 1¼ in. Each structure is composed of a box girder 23 ft wide. The box is 23-ft deep over the piers and 11 ft deep at the center of the main span. Since the tops of the boxes are cantilevered each side, the total width of bridge deck is 95 ft, providing for two lanes of traffic in either direction and a center dividing strip.

The prestressed girders were built by the contractor, Polensky & Zollner of Frankfurt, both ways from the main piers by balanced cantilevering for a distance equal to about one-third the main span. Falsework was then provided for a distance of about 60 ft, after which cantilevering continued to closure at the center. The roadway surface is being added to this bridge at present, and it should be in service before the end of this year.

Although the Bettingen bridge holds the record for the longest-span prestressed girder, the longest prestressed bridge in Germany is in the new circumferential autobahn at Berlin. Its total length is 2,960 ft, and this is made up of spans varying in length from 215 ft to 272 ft. About 93 ft wide, the deck is supported by four 10-ft-square hollow

BERLIN RING ROAD is West Germany's most costly autobahn—$8 million a mile.



AUTOBAHN NOVELTIES: Left: Single cluster of lights on a 150-ft high pole illuminates an intersection. Right: Speed signs differentiate between cars and military tanks.

girders built by cantilevering with mobile forms. The total cost of this long bridge is about $4 million.

• **Concrete marvel**—More spectacular and unusual than either of these notable prestressed girder bridges, however, is the prestressed concrete truss used on the Mangfall Viaduct east of Munich on the autobahn to Salzburg, Austria. The original bridge at this site utilized steel plate girders, and its three spans of 297-356-297 ft were among the longest in the world for this type of bridge. It was also notable for its height, 200 ft above the valley floor.

Wrecked during the war, when one of its tall piers was blasted, the bridge has now been rebuilt on the same foundations. The prestressed concrete truss design by the engineering-construction firm of Dyckerhoff & Widman was chosen in a competition with six designs in steel. The two trusses, 45 ft apart, are 24 ft deep and are divided into x-braced panels 20 ft long. Each panel contains two vertical members and two diagonals. Transverse floorbeams at each panel point and two longitudinal stringers along the centerline support a 10-in.-thick concrete roadway slab.

An interesting aspect is that the transverse struts spanning between the lower chords of the two trusses also carry a wide sidewalk at either side.

Although the design of these trusses was considerably more difficult and indeterminate than for girders, largely because of secondary stresses, the prestressing and arrangement of the tendons was quite similar to that required with girders. The tendons run in the chords, and up through the diagonals as required. The trusses were built by cantilevering and prestressing a panel at a time starting at one end and proceeding across the valley. Four falsework bents were used in the first 297-ft span, which then served as an anchor

EXTRA "QUICK-WAY" NEWS EXTRA
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UNIVERSAL MARION BUYS DENVER CRANE, SHOVEL FIRM

Purchase of "Quick-Way" Truck Shovel Company has been announced by James Mullaney, president of Universal Marion Corporation, Jacksonville, Florida.

Mr. Mullaney said the firm will adopt the trade name of "Quick-Way" Crane-Shovel Company, and will operate as a division of Universal Marion Corporation. G. S. Rigdon has been appointed vice president and general manager of the division.

"It is our plan," Mr. Mullaney continued, "to have "Quick-Way" regain as quickly as possible its former position in the shovel industry. To that purpose, Mr. Anthony Colatrino has been placed in charge of sales activities for the corporation for all sizes of machines, from ⅜ cu. yd. through 4 cu. yd., produced by the Marion Power Shovel and "Quick-Way" divisions.

"Mr. Colatrino will be contacting all distributors of Marion and "Quick-Way" as soon as it is practicable. He will also set up regional sales meetings to acquaint all sales representatives with the products of both divisions. Mr. R. G. Herbst will act as Mr. Colatrino's assistant in handling of "Quick-Way" transactions.

"We intend to develop the best possible organization of distributors and sales representatives. We will have at your disposal the most complete lines of machines in the industry and are determined to obtain the highest possible share of the market."

25-ton crane photographed at the "Quick-Way" office building in Denver

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In the words of A. M. Colatrino, sales manager, "Today's line of "Quick-Way" machines is extremely flexible and adaptable to a wide variety of job problems, and easily convertible in the field for general-purpose work."

He emphasized the variety of front-end equipment available for all 11 "Quick-Way" rubber and crawler-mounted machines, dependable hydraulic control and the use of 8-foot carriers to meet all highway travel requirements as job features important to owners.

Truck-mounted machines in the "Quick-Way" line range in crane lifting capacity from 8½ to 25 tons, and each model can be equipped for shovel, dragline, clamshell and hoe service in capacities ranging from ⅜ to 1 yard. Tractor-type crawler machines range from ⅜ to ½ yard and 6 to 9 tons.

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Today's line of "Quick-Way" machines, the result of a complete re-design program, offers outstanding performance features.

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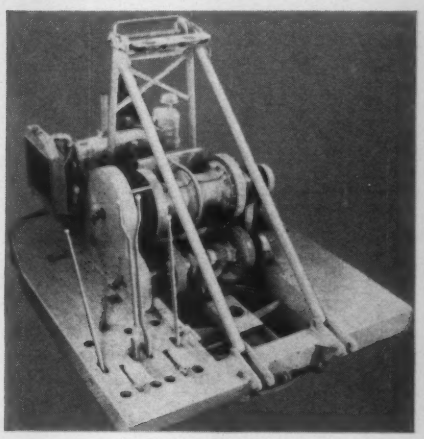
He pointed to such features as (1) the clean simplicity of design throughout, (2) 360-degree visibility for the operator, (3) easy accessibility of machinery for ease of maintenance, (4) all shafts machined with involute splines for greater strength, (5) all main shafts and drum assemblies mounted in heavy-duty anti-friction bearings, (6) conical hook rollers mounted in anti-friction bearings and (7) extra-heavy electrically welded main frames with integral wing frames.



Typical deck machinery view shows clean simplicity of design

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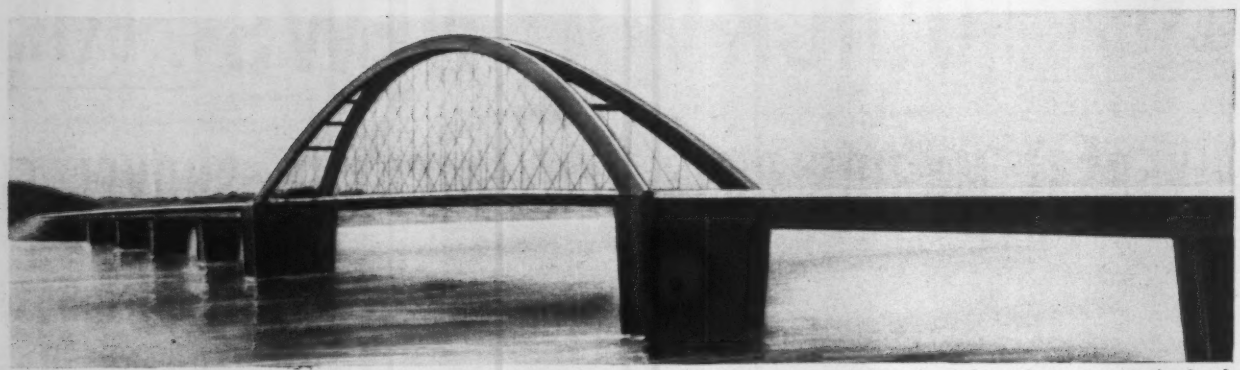
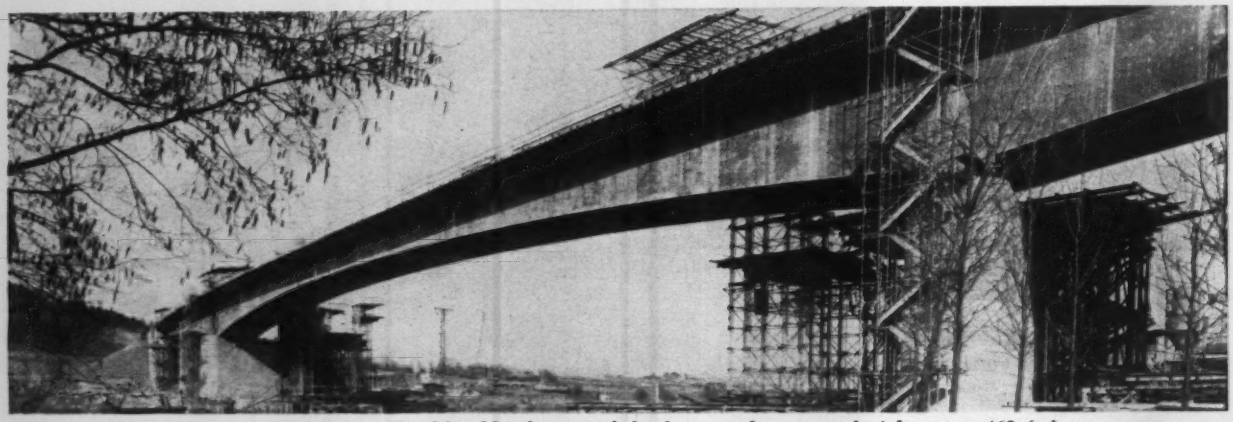


FEHMARN SOUND BRIDGE will include an 825-ft, through-type arch bridge over main ship channel, as shown in artist's sketch



BETTINGEN BRIDGE over the Main on Frankfurt-Nurnberg autobahn has record prestressed girder span, 462 ft long.

so that only three bents were required in the main 356-ft span, and only two in the last span.

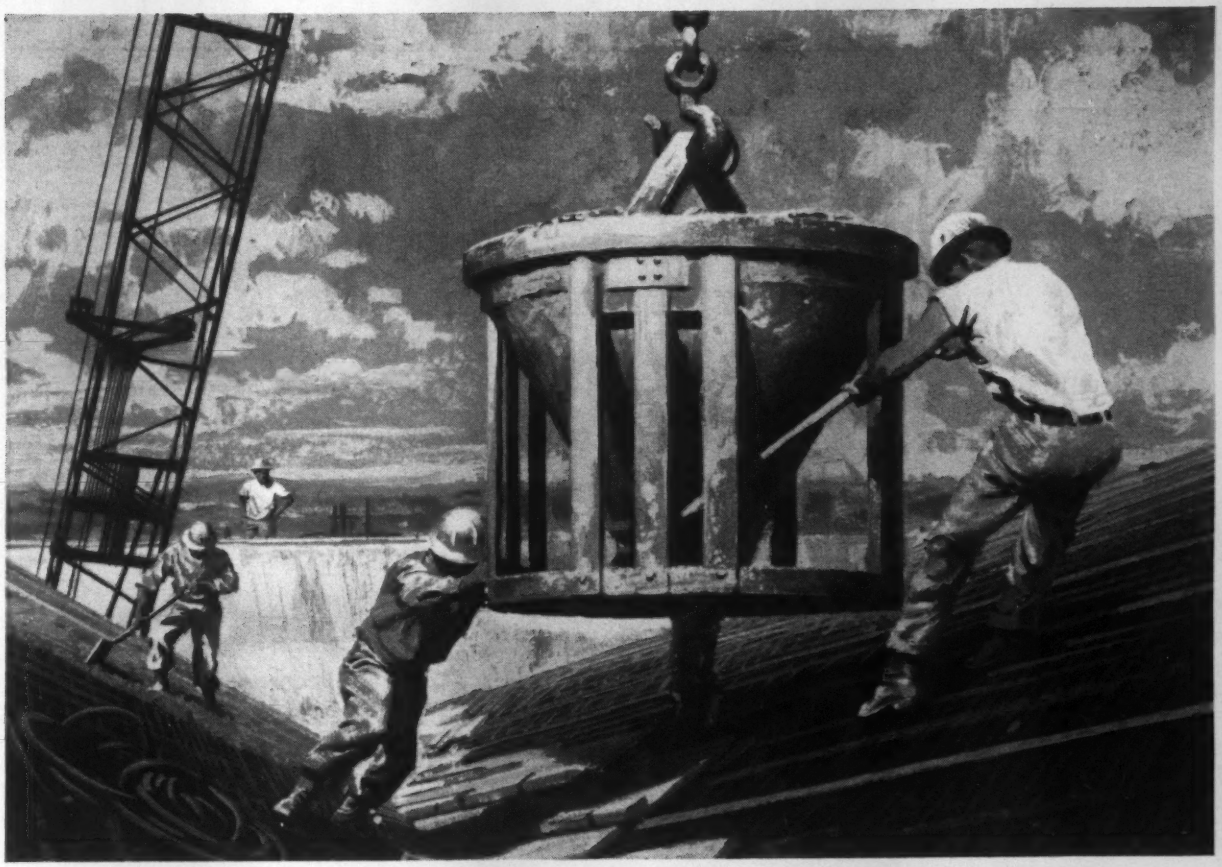
• **A record in steel**—The largest steel bridge now under way in Germany is under construction by the Hein, Lehman Co. of Dusseldorf across the Rhine at Schierstein, near Wiesbaden. With a total length of 3,600 ft it contains a main channel span 675 ft long. This is carried by two I-section girders 23 ft deep at the supports and 14 ft deep at the center. They have lower flanges 5½ in. thick and about 5 ft wide, and their webs are heavily stiffened by a framework that merges with the deep transverse trusses that support the orthotropic plate deck.

Perhaps the most notable detail of this bridge is the use of neoprene bearings to carry the heavy loads of the long channel span. The layer of neoprene is confined in a circular steel ring and is only about 7 in. thick. Each bearing carries a load of about 3,000 tons. This simple type of bearing is a new development in Germany, and was first used by Prof. Fritz Leonhardt on one of the elevated sections of the Dusseldorf autobahn at both the bottom and top of the circular piers. In some cases on this long multi-span structure they were fixed bearings, in others the neoprene assembly was mounted over rollers.

MANGFALL VIADUCT, east of Munich, utilizes prestressed concrete trusses.

• **Last of the big bridges?**—There is a belief among German engineers that most of the country's large-bridge needs have been satisfied. Whether or not this is true, only one large structure is in the offing—a 6-lane-wide crossing of the Rhine at Leverkusen, just north of Cologne—and neither money nor designs are yet available. In the meantime, a remarkable structure in the large bridge class will soon make its appearance in the north of Germany connecting the mainland north of Hamburg with one of the stepping-stone islands to Copenhagen. Some years ago the Danes connected two of their islands on this same route by the great bridge over Storstromen Sound (ENR Dec. 31, 1936, vol. p. 943).

The German bridge will cross Feh-



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The TC-400 is as new as tomorrow – but incorporates the time-proved TORQMATIC design features which for years have demonstrated their merit on tough job after tough job.

It can handle from 150 to 250 horsepower, is far more efficient than other converters in its range. It's available with a front disconnect clutch, industrial or automotive flange, tailshaft governor and integral charging pump for operating customer transmissions.

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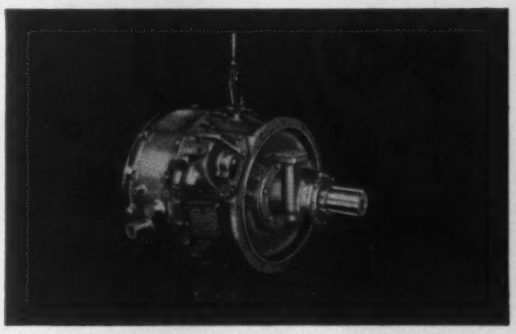

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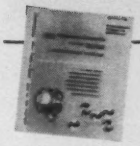

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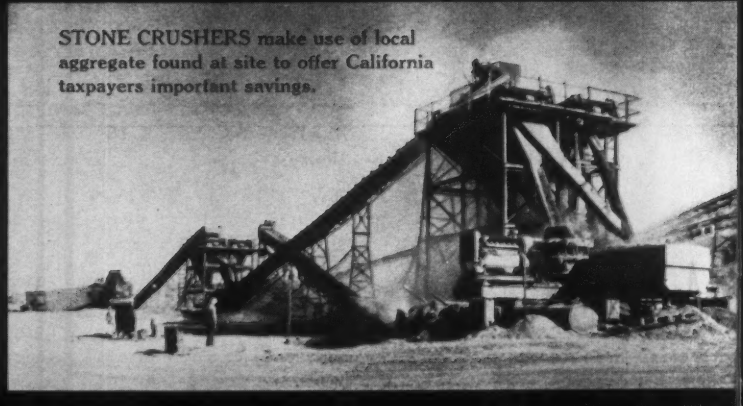
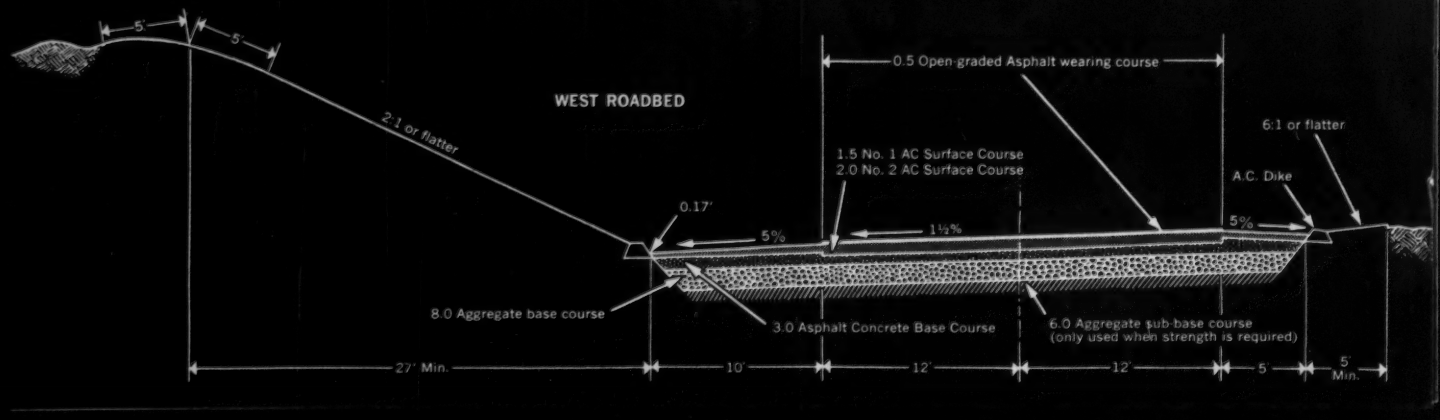
FINISHED ROADWAY on California Interstate Highway 15. Asphalt dikes and embankment on right show unusual drainage design to combat flash floods in Baker Sink region of high Mojave Desert plateau.

ASPHALT DIKES on shoulder edges direct surface water to drainage outlets.

STONE CRUSHERS make use of local aggregate found at site to offer California taxpayers important savings.





CALIFORNIA HIGHWAY ENGINEERS SPECIFY DEEP STRENGTH ASPHALT CONSTRUCTION

Asphalt dikes and ditches to divert Mojave Desert flash flood water from Interstate Highway 15.

California's largest asphalt pavement highway contract used local aggregate crushed on site resulting in substantial economies.

For the 25.2-mile four-lane, divided limited access section of California Interstate Highway 15 that replaces U.S. Route 91 from 1 mile east of Baker, California, to 1 mile east of the Cima Road, engineers of the California Division of Highways chose the Advanced Design Criteria for modern DEEP STRENGTH Asphalt Construction.

Natural Obstacles . . . Location in southeastern California on the high eastern Mojave Desert plateau, with elevations from 1,000 to 4,000 feet, posed some unusual design problems. Temperatures range from 115° in summer to 25° in winter, rainfall averages only 4¾ inches annually (which usually occurs as hard downpours).

Flash floods occur because rainwater reacts with minerals in the dry sand to form an impervious crust. The resulting rapid surface run-off must be controlled to prevent undermining of the roadway. California Division of Highways through many years of study has developed an effective solution to these unique drainage problems by use of diversion ditches and dikes.

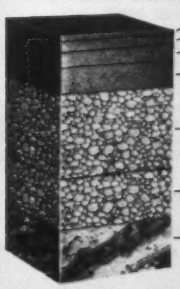
DEEP STRENGTH Design . . . The cross section below shows how California engineers made use of the principles of DEEP STRENGTH Asphalt Construction. Note 4" surface and wearing courses with 3" asphalt-concrete base course. The 8" aggregate base and 6" subbase (where necessary) consist of *water-bound* layers of 1½" max. stone compacted with pneumatic rollers and steel tandem rollers. The 8" aggregate base is primed with 0.25 gal. per sq. yard of SC-2 before asphalt-concrete base course was spread. Total thickness is 15 inches to 21 inches depending on the subsoil.

A median 90 ft. wide was used, with no treatment. (The crust and scant vegetation on median surface was kept intact to minimize erosion during periods of high surface run-off and/or wind.) Outside shoulders are 10 ft. wide and paved. Inside shoulders have 2 ft. paved and 3 ft. unpaved. (In cut sections, 5 ft. wide, all paved.)

Taxpayer Saving . . . DEEP STRENGTH Asphalt Construction allowed California's engineers to use local aggregate crushed at the site. This, plus the inherent economy of Asphalt Construction, results in important savings for the taxpayer of California. And low future maintenance costs on DEEP STRENGTH Asphalt will provide additional tax savings.

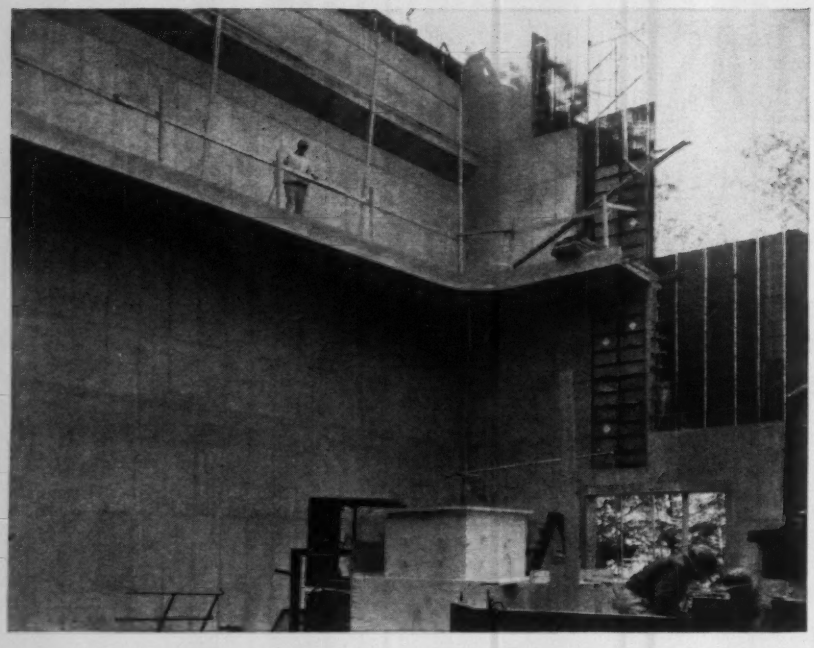
THE ASPHALT INSTITUTE College Park, Maryland

THIS IS DEEP STRENGTH DESIGN ON CALIFORNIA INTERSTATE 15



A. Wearing Course	0.5
B. No. 2 AC Surface Course	1.5
C. No. 1 AC Surface Course	2.0
D. Asphalt Concrete Base Course	3.0
E. Aggregate Base Course	8.0
F. Aggregate Subbase	6.0
G. Subgrade or Improved Subgrade	—
TOTAL MAXIMUM THICKNESS	21.0

Prefabs form cut-up job . . .



Catwalks, haunches poured together with Symons steel-ply forms

One of the best case studies of prefab form versatility in action was that of the atomic reactor facility for Cornell University at Ithaca, N.Y. On one phase of the project, the contractor, Rouse Construction Company, Gouverneur, N.Y. used Symons Steel-Ply Forms to pour monolithically the walk around the reactor, the catwalk and the haunch above it. Pours averaged about 16 feet high.

Symons Forms also showed their adaptability when forming was done around the complicated reactor machinery. It was imperative here that no ties be used in pouring the first six feet of the wall. To solve the problem, Symons Forms were simply attached together and the machinery itself acted as bracing. Some of the walls were as high as 45 feet when completed.

For complete information on Symons Steel-Ply Forms, write us. Ask also about our free engineering service . . . rental purchase options . . . and complete-line catalog.

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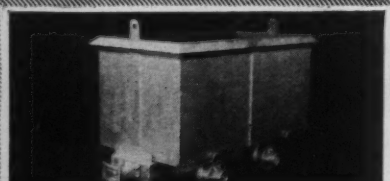

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SIMPLEX JACKS

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TEMPLETON, KENLY & CO.

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marn Sound, and its main channel span will be an 825 ft through-type arch. The two arch ribs will converge and join into one at the center of the span, and the roadway will be suspended by a system of vertical and inclined cables.

The foundations for this unusual structure are presently under construction using DeLong pier units that can float into place and lower their supporting legs to the bottom. Seven girder spans will comprise the approaches to the Fehmarn Sound Bridge.

• **More than buildings, road, bridges**— The traveler in Germany today could, of course see many other things of engineering and construction interest besides tall buildings, express roads and bridges. He could see the new Rendsburg highway tunnel, opened in June under the Kiel Canal, 2,100 ft long and carrying four lanes of traffic. He could see the extensive dambuilding operations on the Moselle River above Coblenz, destined to convert this stream to a navigable waterway for 1,500-ton boats and produce a sizable amount of hydraulic power. He could see construction equipment uncommon or unknown in the U. S. such as tall tower cranes, single mast cableways, teleferiques and large nests of pipe through which concrete is pumped from mixer to structure. And he could see military installations in the design and construction of which U. S. Army Engineers still play a prominent role.

But the over-all conclusion would be the same: Western Germany's miraculous recovery from the vast destruction it suffered in the war is a tribute to its engineering profession and construction fraternity, and the free, democratic private enterprise system under which they function. It is one of history's great tragedies that Eastern Germany has been denied the opportunity to operate under this same system and experience a similar recovery.

More About West Germany

For more information on West German construction see:

West Germany's Expanding Highway Network, Feb. 2, p. 52; Phoenix in Dusseldorf, Jan. 5, p. 47; Housing on Hitler's Parade Grounds, Dec. 15, 1960, p. 48; Andernach's Prestressed Bridge, Nov. 17, 1960, p. 38; Germany's Longest Prestressed Bridge, Sept. 1, 1960, p. 28; Mannheim's Bridge over the Rhine, July 7, 1960, p. 42; Rhine River Power and Navigation, Feb. 25, 1960, p. 57; Severins Bridge at Cologne, Feb. 4, 1960, p. 34; Prefabricated Apartments in Germany, Dec. 3, 1959, p. 34; Dusseldorf Skyscrapers, April 9, 1959, p. 49; Germany's Highway Program, Jan. 15, 1959, p. 30.

BETHLEHEM STEEL

BETHLEHEM STEEL

TOWER OVERLOOKS SAN FRANCISCO BAY. This 29-story tower addition makes the Fairmont San Francisco's tallest hotel. To be ready for occupancy in 1962, the earthquake-resistant steel structure is connected with Bethlehem high-strength bolts. Bethlehem fabricated and erected the 3,089 tons of steelwork.

Steel

for Strength
. . . Economy
. . . Versatility

The 7-story base of the Fairmont Hotel's addition will contain a 200-car garage, a convention-exhibit hall, and, at lobby level, a dance pavilion and garden area.

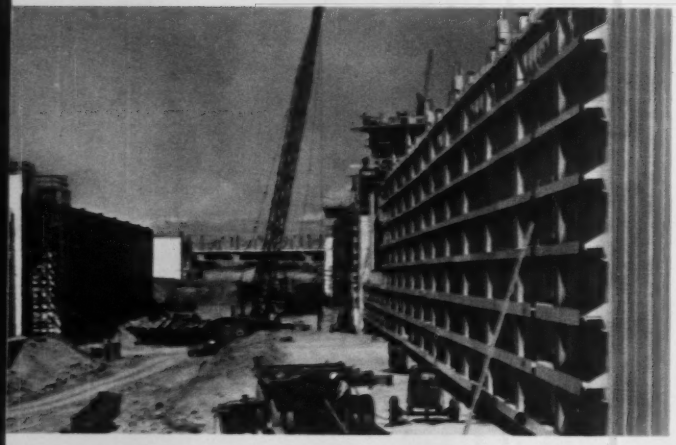
Architect: Mario Gaidano; *Structural engineer:* H. J. Brunnier; *General contractor:* Haas and Haynie Corporation

BETHLEHEM STEEL

Architect: Stone, Marraccini and Patterson; *Associate architect*: Foss, Olsen and Sands; *Consultant*: Alston G. Gutterson; *Structural engineer*: John H. Stevenson; *General contractor*: Lease Company, Inc.; *Fabrication and erection*: Bethlehem Steel

ALASKAN HOSPITAL STEELWORK ERECTED IN 4 WEEKS.

The 608-ton steel frame for this $5½-million state mental hospital at Anchorage had to go up fast . . . and it did. Steel framing will also make it easy to add floors when the hospital's 225-bed capacity can be doubled.



MAN-MADE "CANYON" OF STEEL SHEET PILING.

Within three years, ocean-going vessels will steam up a 43-mile-long, deepwater channel from San Francisco Bay to Sacramento. At the right, in this view, is a portion of one of two 400-ft-long approach guide walls for California's first navigational locks. The "canyon" walls are formed by Bethlehem steel sheet piling. The locks, located near Sacramento, are a section of a barge canal to connect the deepwater channel with the Sacramento River.

Design, engineering and supervision of construction: U.S. Army Corps of Engineers; *Contractors*: Lock-Bridge Constructors, a joint venture of Rothschild, Raffin and Weirick, Inc., Yuba Consolidated Industries, Inc., and George Pollock Co.

TUNNEL BEGINS 200-MILE TRIP.

This 305-ft-long steel segment is one of twelve being fabricated at Port Deposit, Md., for a two-lane vehicular tunnel to be laid in a trench on the bottom of the Elizabeth River, connecting Norfolk and Portsmouth, Va. Each segment consists of ten 33-ft-diam joined assemblies totalling nearly 600 tons of steel, much of it steel plate supplied by Bethlehem. Each segment is launched into the Susquehanna River and towed 200 miles to the job site where it is sunk into position.

Owner: Elizabeth River Tunnel District of Norfolk; *Designer and supervisor of construction*: Parsons, Brinckerhoff, Quade and Douglas; *Prime contractor*: Diamond Construction Co.; *Fabricator*: Wiley Manufacturing Co., subsidiary of Republic Industrial Corp.

for Strength
. . . Economy
. . . Versatility

Steel

Substructure contractor: James P. McHugh Construction Co.; *Approaches contractor*: J. M. Corbett Co.; *Electrical contractor*: Wood Electrical Construction, Inc.; *Design and engineering*: Dept. of Public Works—George DeMent, Commissioner; Bureau of Engineering—Dick Van Gorp, Chief Engineer; Div. of Bridges and Viaducts—Stephen J. Michuda, Chief Bridge Engineer; Consultants—A. J. Boynton & Co.

Owner: District of Columbia Armory Board;
Architect and engineer: Dahl-Ewin-Osborn; *Builder*: McCloskey & Co.

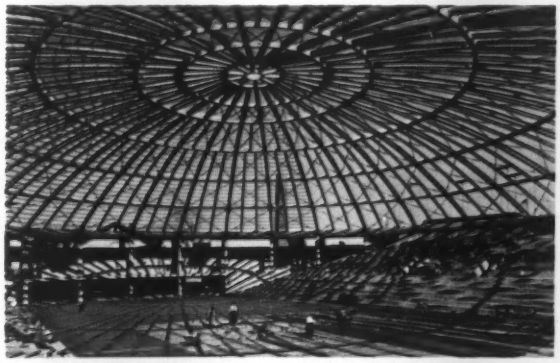
NEW STADIUM FOR THE NEW SENATORS,

and the Washington Redskins. Sixty-six giant frames cantilever far out over the stands in this unique Washington, D.C., stadium. The frames, welded from Bethlehem steel plate, will support the roof of this $15-million, double-deck, circular structure. More than 7,000 tons of steelwork were fabricated and erected by Bethlehem. Bethlehem also supplied over 5,000 tons of steel reinforcing bars. Seating capacity: 43,500 for baseball and 50,000 for football.

$8½-MILLION VIADUCT will speed traffic over the Chicago Junction Freight Yard. South Damen Avenue Viaduct will run 4,760 ft, plus 1,940 ft of approaches. The 63-ft width includes two 25-ft roadways, a medial barrier, and a sidewalk. Bethlehem is fabricating and erecting 9,000 tons of structural steel. Pierwork, approaches, and paving will need 2,200 tons of steel reinforcing bars, a major portion of which Bethlehem is supplying.

STEEL DOME FOR UNIVERSITY AUDITORIUM.

Brown University will soon stage its hockey games in this unique structure . . . the George V. Meehan Auditorium. The 208-ft-diam circular dome is framed with 296 tons of Bethlehem structural steel. Some 51,700 linear ft of 1 ¼-in. Bethlehem steel pipe form a part of the ice-making system. The rink also contains 185 tons of Bethlehem steel reinforcing bars.



Architect: Perry, Shaw, Hepburn and Dean;
Consulting structural engineer: Nichols, Norton & Zaldastani;
General contractor and steel erector: Gilbane Building Co.;
Fabricator: Tower Iron Works, Inc.;
Refrigeration and piping contractor: Henry J. Coupe & Son, Inc.;
Pipe supplier: United Supply Co.

STEEL WATER PIPE FOR ST. PAUL. Two major lines are among the several phases of St. Paul's farsighted, $21.5 million water supply project. The Fridley Line (above) will be a 42,000-ft, 60-in.-ID main, extending from the Mississippi to a receiving basin. The Vadnais Conduit, 22,000 ft of 90-in. ID gravity-flow line, will deliver water from the storage area to a filter plant. Both lines will consist almost entirely of Bethlehem steel pipe.

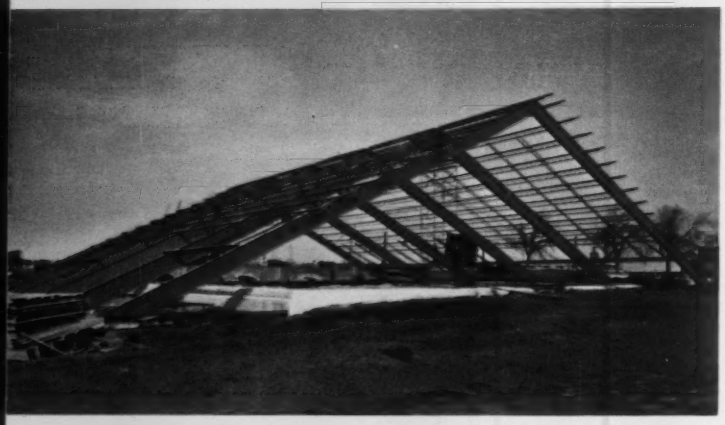
Consulting engineer: Black & Veatch;
General contractor: Ashbach Construction Co.;
Subcontractors for Fridley Line: Peter Lametti Construction Co. (Pipe laying),
Moorhead Machinery & Boiler Co. (Welding),
Koppers Co., Inc. (Exterior pipe coating),
Centriline Corp. (Cement mortar pipe lining)

BETHLEHEM STEEL

BIG STEEL BOLTS ANCHOR TITAN MISSILE SHAFT.

Pressure exerted by water seepage in Titan missile-launching silos at Royal City, Wash., tends to "float" tons of steel-reinforced concrete which make up the walls and floors of the silos. Bethlehem is supplying some 2,500 special, 30-ft-long, large-diameter bolts to anchor the floor. Bethlehem is also furnishing more than 2,000 tons of fabricated structural steel for the launchers, and over 4,600 tons of fabricated reinforcing steel for the silos.

Engineer: U.S. Army Corps of Engineers;
Contractor: McDonald-Scott and Associates;
Miscellaneous fabrication: Northern Steel and Supply Co.



THIS 120-TON STEEL TENT frames a restaurant, cocktail lounge, and three function rooms for the Dolphin Motor Hotel, Quincy, Mass. Bethlehem is supplying all the structural steel used in this and the second phase of the 104-unit motel's construction.

Architect: Bedar & Alpers Associates;
General contractor: Oxford Construction Corp.;
Fabricator: Antonelli Iron Works, Inc.;
Erector: Daniel Marr & Son Co.

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Structural Steel . . . all standard and wide-flange shapes

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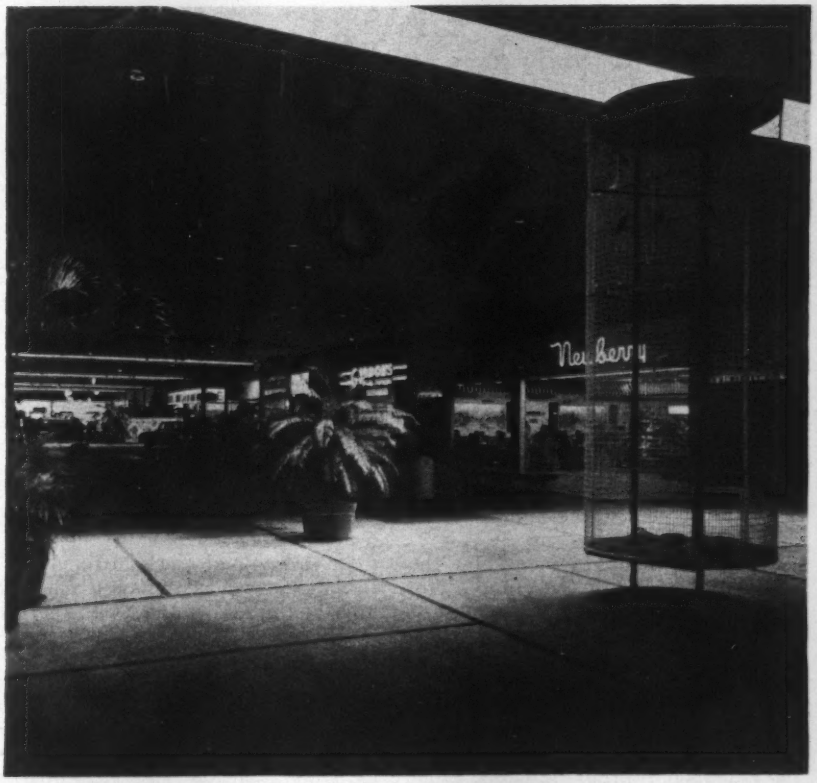
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Water covered roof reduces solar heat gain of air-conditioned shopping center in Alabama.

Packaged Heat Pumps Cool Mall



Sunlight, plants and cool air make mall a shopper's oasis.

The Eastwood shopping center in Birmingham, Ala., is the third largest enclosed mall in the U. S. It is also top contender for the title of the world's largest single installation of packaged heat pumps.

The $4-million center boasts 47 water-source heat pumps that heat and air-condition 43 stores and 50,000 sq ft of sidewalks.

Total heating or air-conditioning capacity inside the 7.5-acre shopping haven is 1,015 tons. Another 90 tons cool Eastwood's 48-lane bowling alley, which is built under a separate roof. Cost per square foot for the shopping center was $11.

• **Why packaged heat pumps**—Because the heat pump merely reverses its refrigeration cycle to provide heat instead of cool air, it can serve both heating and air conditioning needs effectively—provided that local temperatures, electrical costs and other design conditions permit.

At Eastwood, however, the decision to install heat pumps was wrapped up in a decision to install the packaged type.

Packaged heat pumps offered these three major advantages over centralized heat pumps:

(*Please turn the page*)

Say, this Universal outfit gives real complete engineering service.

What kind of service?

Says here they provide complete form details, estimates, bills of material — got field service men too. Claim they're concrete forming experts — been in business since 1912. — Make UNI-FORM Panels.

Where do I get more information on this outfit?

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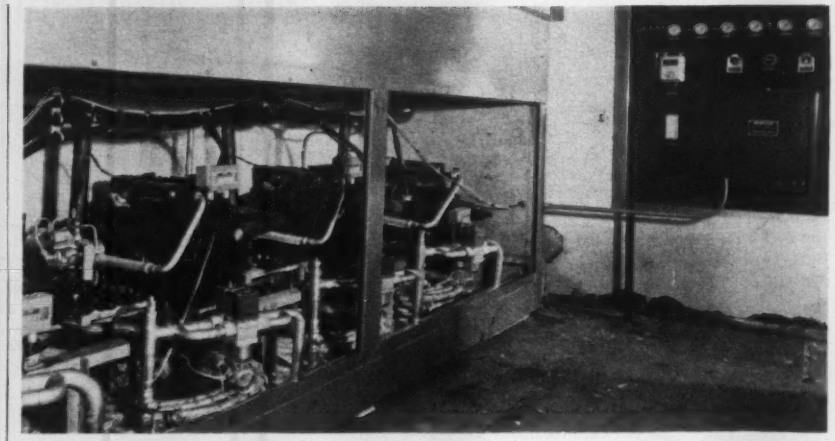


PACKAGED HEAT PUMP is pneumatically controlled by panel board on wall.

• They required only 50% of the space a centralized system would need.

• Store owners can easily plan changes, simply by adding or taking away individual heat pumps.

• They greatly simplify leasing and billing problems for store owners.

Tenant stores pay for their own utilities and pay a yearly flat rate for water supplied to the heat pumps. Since each heat pump is under pneumatic, thermostatic control, the individual store manager can regulate it. This also simplifies fresh-air intake. Fresh air enters through the heat pumps at each store, then exits to the mall. Where store needs vary, owners make their own adjustments, as in larger department stores requiring 100% outside air, or as in the restaurant where electric blast heaters reheat the air for humidity control.

One of the major reasons for the installation of heat pumps at Eastwood is the large supply of underground water, available at 65 F all year. For more than 70 years a flowing well existed on the mall site. When geological surveys revealed a large underground stream from 80 to 120 ft below, three wells were sunk. One well handles the majority of heat pump needs, the second comes in at peak load, and the third well is a standby.

During cooling operation, the heat pumps use about one gal per ton per min. For heating, they use about 1.25 gal per ton min. Condenser water exhausts to the roof in the summer to reduce the solar heat gain.

The heat pumps supplied by the Typhoon Division of the Hupp Corp. do not require any special water treatment, the manufacturer claims. The pumps have tube-in-tube condensers made of corrosion resistance admiralty metal, without internal joints.

According to the estimates of the utility company, winter heating costs of the Eastwood heat pumps will be about ⅓ that of fuel-fired systems.

• **Installation**—Heat pump sizes vary. The largest one has a capacity of 50 tons, the average is 15, and the smallest is 3. Five 15-ton units, mounted above the stores, service the mall area.

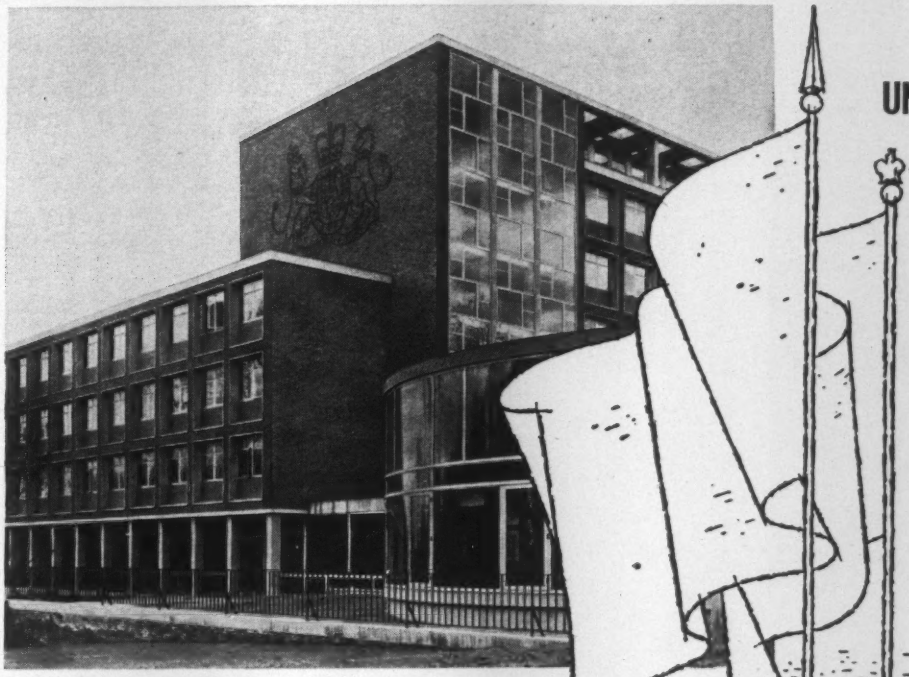
The cooling load for the center is calculated to be 803 tons for the stores, plus a mall load of 87 tons. The winter heating load is 12.7 million Btu an hour, equivalent to 1,061 tons of refrigeration. Lights and occupancy contribute enough heat to bring the seasonal loads into approximate balance.

Before the air from the stores flows outside, it passes through the mall and reduces the mall cooling load by 70 tons into the mall and then to the outside. The cooling load of the mall is divided five ways: 32% for solar gain, 22% for conduction, 21% for air infiltration, 14% for occupancy and 11% for lights.

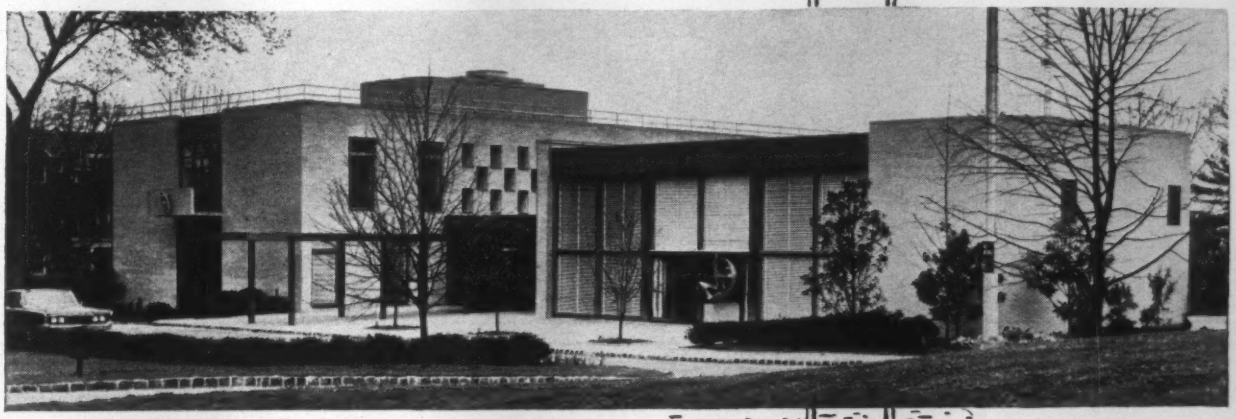
• **Shopping convenience**—The exterior facade of the main enclosure is actually the rear of the stores, because all stores front on the interior walks, which are air conditioned. The main mall is 750 ft long and 50 ft wide. It forms a perpendicular axis with two 200-ft long malls on one side and one 150-ft mall on the other.

For an atmosphere of comfort, plants and trees adorn the walks and natural light enters from skylights to blend with artificial lighting. Two pools stocked with fountains, statuary and rainbow trout enhance the mall. And store fronts are diversified with a variety of materials such as ceramic tile, native stone, glazed and rough textured brick. In some cases owners chose to eliminate walls and integrate stores with the mall itself. In such stores chain walls close off the property at night.

Design is by Willard Thorsen, Minneapolis architect. F. F. Hoar and Son, Inc., Birmingham, is the general contractor. And Lewis D. Freedland, also of Minneapolis, is the consulting engineer.



British Embassy, Washington, D. C.
Architect: Eric Bedford, Chief Architect and W. S. Bryant, Superintending Architect, British Ministry of Works.



Swiss Embassy, Washington, D. C.
Architect: William Lescaze, New York, N. Y.

UNDER TWO FLAGS . . .

Lehigh Mortar Cement

• The British and Swiss Embassies in Washington are recent examples of fine masonry work on which John McShain, Inc. has used Lehigh Mortar Cement.

They know from long experience that the workability and plasticity of Lehigh Mortar Cement help masons do top quality work—that its uniformity and durability contribute to clean, strong, weathertight walls.

Use Lehigh Mortar Cement on your next job. It will help your masonry crew get the best possible results. Lehigh Portland Cement Company, Allentown, Pa.

Contractor: John McShain, Inc., Philadelphia, Pa. and Washington, D. C.
Lehigh Mortar Cement: Eckington Building Supply Co., Washington, D. C.
Ready Mix Concrete: Howat Concrete Co., Washington, D. C.

LEHIGH CEMENTS

- LEHIGH MORTAR CEMENT
- LEHIGH EARLY STRENGTH CEMENT
- LEHIGH PORTLAND CEMENT
- LEHIGH AIR-ENTRAINING CEMENT

This boulevard says STEEL in a big way

USS MAN-TEN High Strength Steel combined with A7 carbon steel cuts weight and reduces costs

Pittsburgh's new Crosstown Boulevard begins at one of the busiest spots in town—the elevated intersection of the Boulevard of the Allies and the approach to the Liberty Bridge. It crosses over two railroad spurs and two heavily traveled thoroughfares before reaching grade near the sports arena.

Here is another case where the use of USS MAN-TEN (A440) High Strength Steel combined with A7 carbon steel resulted in substantial economies and less weight.

The designers and engineers, Richardson, Gordon and Associates, had already used USS MAN-TEN (A440) Steel in the Penn-Lincoln Parkway to reduce weight of members by 23% to 29%. Costs went down, too, because USS MAN-TEN (A440) Steel is cheaper than structural carbon steel when weight reduction is 17% or more. MAN-TEN Steel's high yield point of 50,000 psi permits designing to permissible allowable stresses of 24,000 compared to 18,000 psi for A7 steel.

The Crosstown Boulevard is a good example of how you can combine A7 steel with USS MAN-TEN (A440) structural shapes and built-up sections for economical short-span bridge construction. In all, 1,554 tons of USS MAN-TEN High Strength Steel were used on this project and consisted of 36″ WF beams and plates. The riveted built-up sections shown were fabricated from USS MAN-TEN Steel plates and angles. Webs are 54½″ deep.

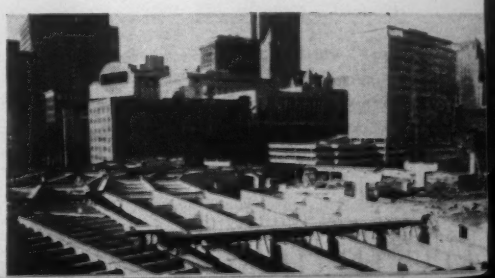
United States Steel also makes A36 (36,000 psi, minimum yield) structural carbon steel, USS COR-TEN and USS TRI-TEN Brands High Strength Steel (50,000 psi minimum yield point), and USS "T-1" Constructional Alloy Steel (100,000 psi minimum yield strength). For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, MAN-TEN, COR-TEN, TRI-TEN and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal & Iron Division • United States Steel Supply Division • United States Steel Export Company

USS United States Steel

Greater strength—more clearance. USS MAN-TEN Brand High Strength Steel, as one member of the USS "family of steels," reduced weight and cost in these structural shapes and built-up girders.

Pittsburgh Crosstown Boulevard
Owner: Pennsylvania Department of Highways, Harrisburg, Pennsylvania. Designer: Richardson, Gordon and Associates, Pittsburgh, Pennsylvania. Fabricator and Erector: Pittsburgh Bridge & Iron Works, Pittsburgh, Pennsylvania. General Contractor: Sanctis Construction, Inc., Pittsburgh, Pennsylvania.



CONCRETE BELL AND SPIGOT
ROUND RUBBER GASKET
Wet grounds couldn't stop this double play
Engineers: Black & Veatch
Contractor: Torson Construction Co.

A-M REINFORCED CONCRETE PIPE with CONCRETE and ROUND RUBBER JOINTS

The problem:

Installation of 8,000 ft. of concrete sewer pipe running parallel to a creek and below its water level. The problem was complicated by numerous springs and unstable ground conditions so serious as to allow opening the trench for only one or two lengths of pipe at a time.

The solution:

Long lengths of A-M's 60″ C. & R. R.* pipe reduced the total number of necessary joints. Quick, easy fitting of the joints cut installation time in spite of the problem of poor ground conditions. Tight joints far exceeded the maximum infiltration requirement for this Johnson County, Kansas project.

Write our technical staff for help in solving your problem.

*American-Marietta's Concrete And Round Rubber Joint.

AMERICAN-MARIETTA COMPANY
CONCRETE PRODUCTS DIVISION
GENERAL OFFICES:
AMERICAN-MARIETTA BUILDING
101 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS, PHONE: WHITEHALL 4-5600

Low Volt Circuit Breaker Upgrades Ampere Ratings

Federal Pacific Electric Company has up-rated its latest line of powered circuit breakers so that users can have greater protection wherever small frame sizes are needed.

Previously, the standard continuous-current ratings for low-voltage breakers were 225, 600, 1,600, 3,000 and 4,000 amp.

The FP-50 series now offers increased ratings at 400, 800, and 2,000 amp for the three sizes. And instead of a cascade system of interrupting capacities, series FP-50 has an asymmetrical interrupting capacity of 50,000 amp, at 600 volts.

Breakers in series FP-100 are rated at 3,000 and 4,000 amp continuous, with 100,000 amp asymmetrical interrupting capacity.

Both the trip coil and timing device on all FP breakers can be adjusted with a screwdriver, and the trip coil can be replaced in the field without replacing the timing device.

The stored-energy assembly, for power breaking, may be specified to function with any one of three different operating mechanisms: manually charged, electrically charged, or a combination of manually and electrically charged.

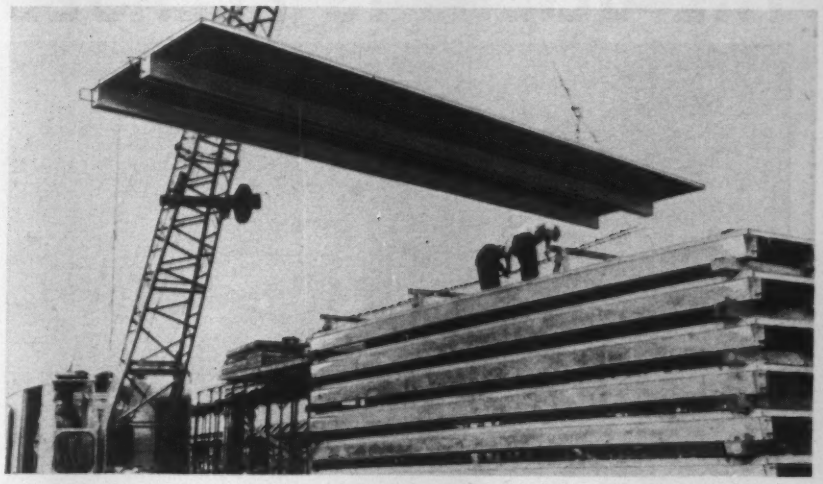
FP breakers can be moved from connected, test or disconnected positions without opening the enclosure door. With the door open, the entire breaker can be rolled out of the cell and then lowered to the ground by means of a built-in hoist that is provided with 90-in.-high enclosures. All FP-50 breakers can be stacked four high in a 90-in.-high enclosure. Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.

One-Coat Enamel Process Cuts Curtain Wall Costs

Bethnamel sheet steel requires only one coat of porcelain enamel where other steels require two. Produced under an open-coil annealing process, the new steel is said to cut enameling costs 15 to 50%, and thus indirectly allows savings on installation of colorful curtain walls.

Bethnamel steel has a carbon content of 0.003%, or ⅓ that of ordinary enameling iron. It is easy to work, has excellent sag resistance and welding properties.

Also, according to the manufacturer, because it can easily be deep-drawn, pans as deep as 6 in. and sharp corners can be formed. Bethlehem Steel Co., Bethlehem, Pa.

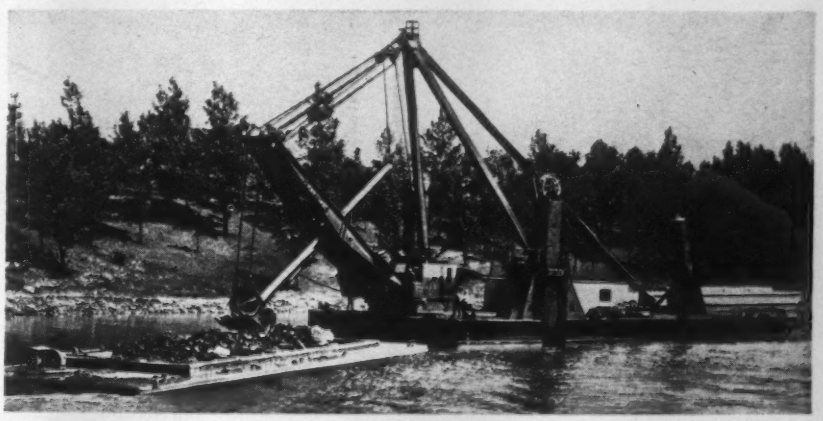


Prestressed Deck Has F-Section

Roofs built with prestressed, precast, Mono-Wing F-Sections show no straight through erection joints, according to the manufacturer. F-Sections are formed with two beams and integral 2-in-thick slab.

One beam is cast in the center of the 64-in.-wide slab. The other beam overhangs the edge of the slab to form a step joint for the beamless edge of the next F-Section. The joint between F-Sections is hidden from below by the overhanging beam that supports both sections.

The beams are 10 in. deep, 4 in. wide, and have tendons tensioned to 175,000 psi. Deck members are available in lengths up to 40 ft. Hi-Stress Division, Anchor-Wate Co., P.O. Box 45856, Houston 45, Texas.



Excavator Works on Land or Sea

Manitowoc's Model 4600 "Vicon" dredge can work as either a crawler or marine-mounted excavator and will achieve full capacity either way, says the manufacturer.

It can be rigged as a shovel, clamshell, dragline or for high-lift operations. Heavy-duty booms for lifts up to 200 tons are also available. Digging depths can be increased by longer trench-hoe sticks.

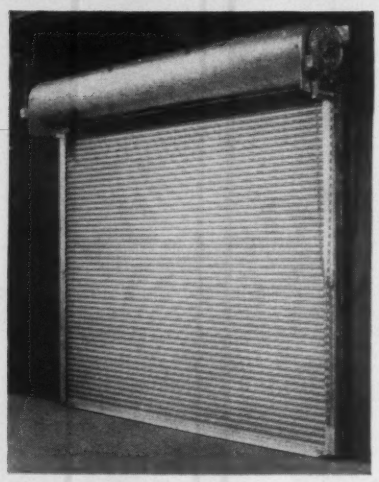
The marine hull has a diesel engine with torque converters so that power can be automatically applied to raise or lower the spuds and operate the deck winch. A retractable A-frame is provided to handle the main spuds.

Walking spuds, operated from the pilot house, move the dredge forward or backward.

A four-man crew can operate the dredge. All the required life-saving, fire fighting and navigating equipment are installed. Manitowoc Engineering Corp., Dept. MS, Manitowoc, Wis.

THE CLIENT IS PLEASED

American Airlines Hangar #10
Idlewild Airport, New York City
Arch./Engr.—Kahn & Jacobs
Contr.—Turner Construction Co.



Automatic Rolling Fire Door UN20

Since 1958 American Airline's Hangar #10 has been protected by Balfour Automatic Rolling Steel Fire Doors. These doors combine automatic fire protection with the dependable service essential to quick aircraft maintenance in this jet age hangar.

Balfour rolling doors

doc-port® doors
steel service doors
automatic fire doors
pygmee® counter doors
steel grilles

Catalog in Sweet's or write:
WALTER BALFOUR & CO. INC. **Brooklyn 22, N. Y.**

23

New Product Briefs

Trench Covers

Aluminum plate covers for interior and exterior trenches up to 9-in. wide. Fits flush with floor, easily removed. For wire runways, floor and sidewalk drains. Architectural Art Mfg., Inc., 3239 North Hillside, Wichita, Kan.

Joint Sealant

Compriband, a resilient waterproofing sealant for windows, doors, panels, expansion joints, concrete and metal applications. It returns to original size and shape after the pressure has been released. Pacific Sealants, 1491 Daisy Ave., Long Beach 13, Calif.

Roof Coating

Desco Neolon, for weatherproofing roofs and other exterior surfaces with a variety of pitches and curves. Made of synthetic rubber, the new coating is a combination of du Pont's Neoprene and Hypalon. Desco International Association, Box 74, Buffalo, N. Y.

Chain Saws

Four chain saws capable of felling trees up to 10 ft in diameter. Two gear-driven models available in 2.8 or 3.5-to-1 gear ratios. Two chain models. Capacities up to 10 ft dia tree. Homelite, Port Chester, New York.

Cable-Laying Device

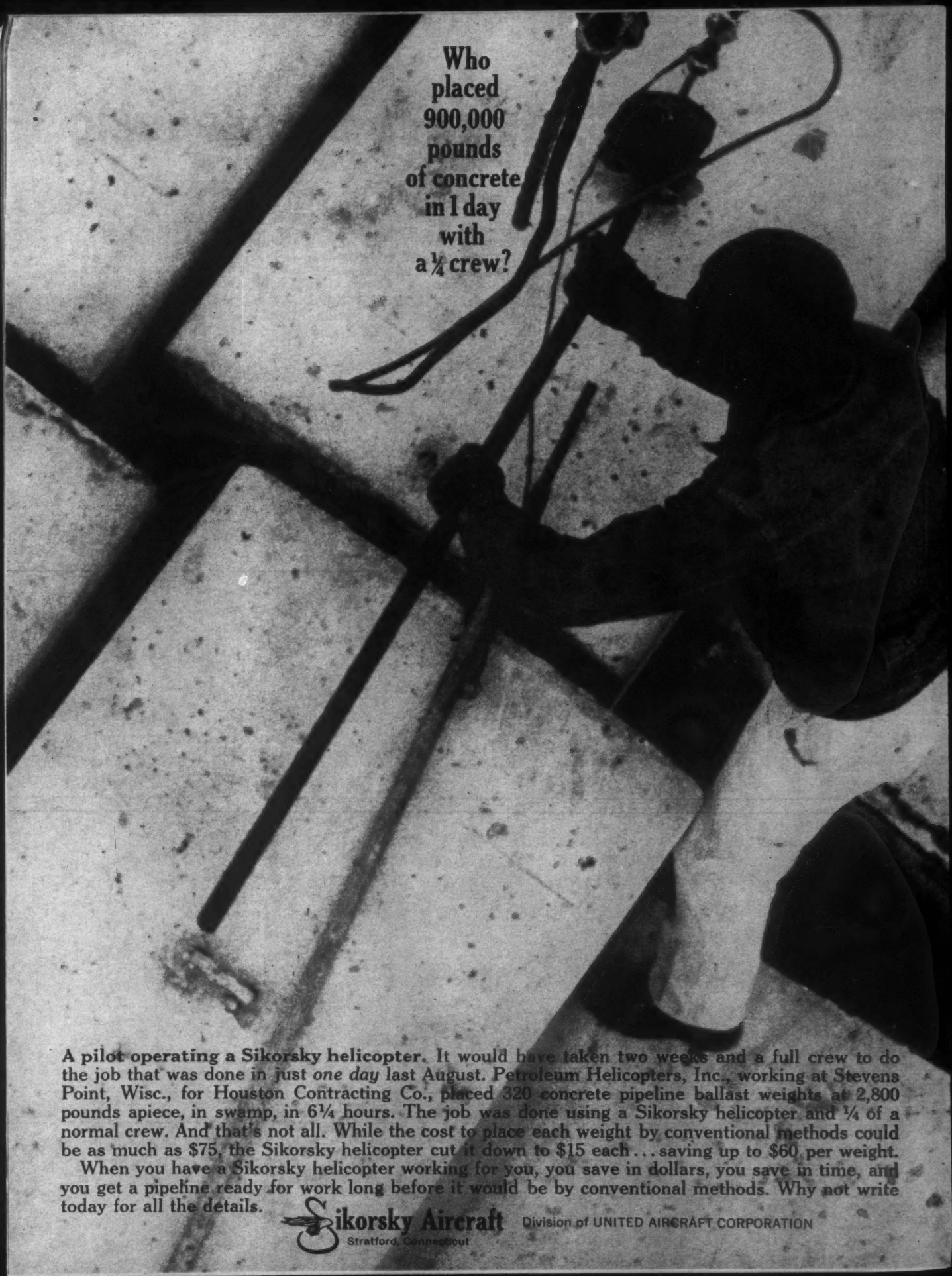
For use on Caterpillar track-type tractors that have hydraulic controls. Handles cable or wire up to 3½ in. OD. Lays cable to depths from 1 ft to 6 ft. Vertical and lateral movements are hydraulically controlled. Gets within 2 ft of walks, buildings. Can be steered around turns. Kelly Products Div., Crutcher, Rolfs, Cummings, Inc., Houston, Tex.

Measuring Tapes

Line of precision measuring tapes, metallic and nonmetallic woven linen, 50 and 100-ft lengths graduated in feet, tenths and half tenths; also in feet, inches and quarter inches. Plastic coated. Price of 50-ft tape is $13.75; 100 ft, $21.75. Koh-I-Noor, Inc., Bloomsbury, N. J.

Concrete Tester

CT-710-B tests compressive strength of 6-in.-dia concrete cylinders or 6-in. concrete cubes. Calibrated to an accuracy of 1% of indicated load. Load capacity is 125 tons, can be applied at constant rate between 25 and 50 psi per second. Weighs 480 lb. Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill.

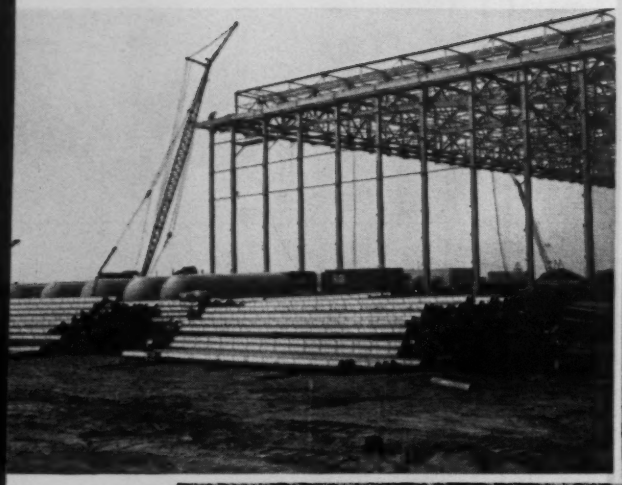


A pilot operating a Sikorsky helicopter. It would have taken two weeks and a full crew to do the job that was done in just *one day* last August. Petroleum Helicopters, Inc., working at Stevens Point, Wisc., for Houston Contracting Co., placed 320 concrete pipeline ballast weights at 2,800 pounds apiece, in swamp, in 6¼ hours. The job was done using a Sikorsky helicopter and ¼ of a normal crew. And that's not all. While the cost to place each weight by conventional methods could be as much as $75, the Sikorsky helicopter cut it down to $15 each... saving up to $60 per weight.

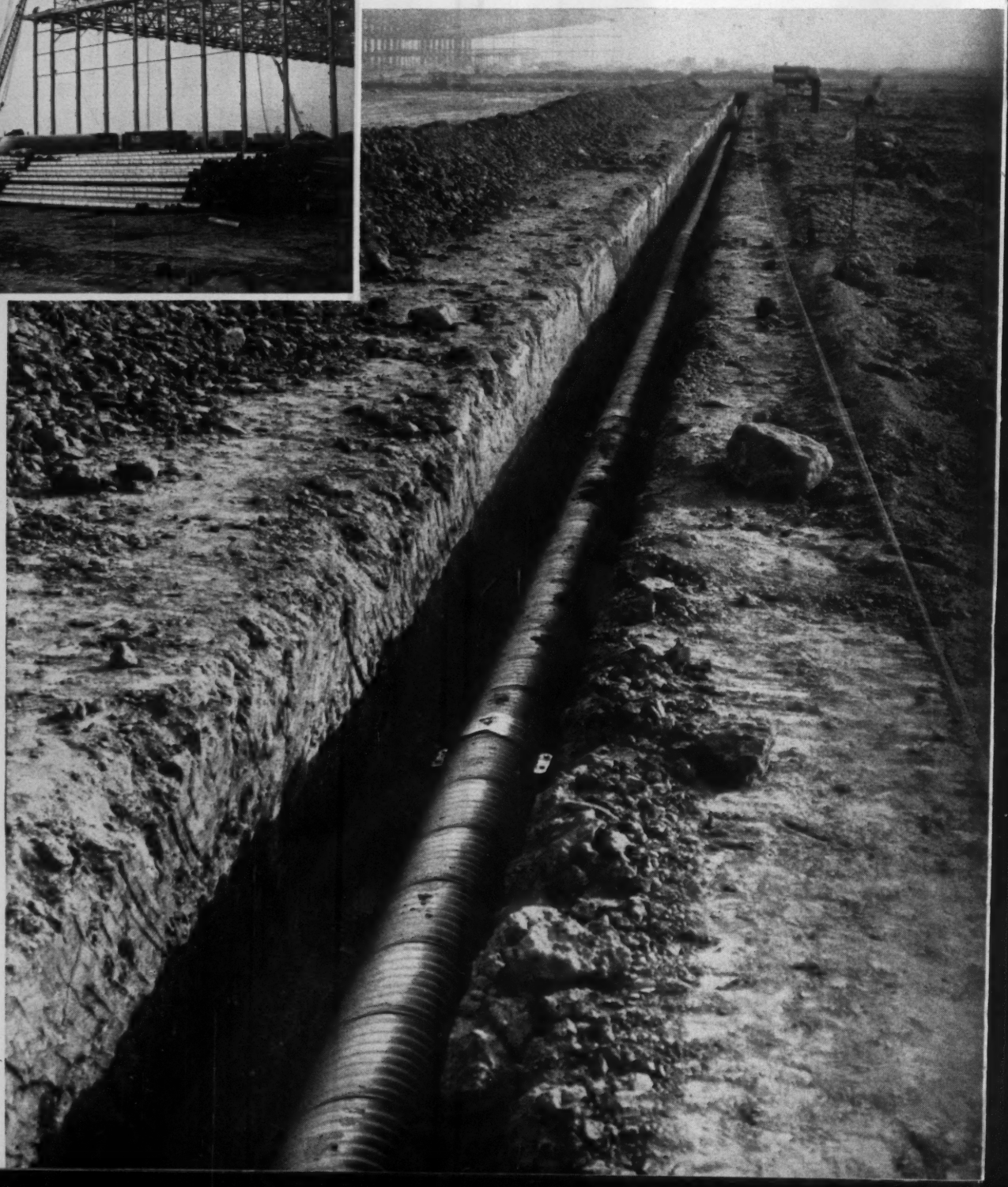
When you have a Sikorsky helicopter working for you, you save in dollars, you save in time, and you get a pipeline ready for work long before it would be by conventional methods. Why not write today for all the details.

Sikorsky Aircraft
Stratford, Connecticut
Division of UNITED AIRCRAFT CORPORATION

56,315 FEET OF REPUBLIC



Literally miles of Republic Drainage Products have gone underground at Chicago's $135,000,000 O'Hare Field expansion. Now covered by reinforced concrete many inches thick, Republic LOK-COR shown here is relied on to keep pavement and subsoil dry for the life of the runway.



DRAINAGE PRODUCTS

installed at O'Hare Field

Nearly eleven miles of Republic Drainage Products are being installed at O'Hare Field, Chicago, to help drain an area totaling 7,000 acres . . . very likely the largest project of its kind ever undertaken.

Republic *FREE-FLOW* and Republic Asphalt Coated and Paved Pipe up to 96″ diameter have been installed beneath two new 11,000 foot jet runways, to handle water run-off. The pipe must stay in service . . . for the life of runways. Republic *FREE-FLOW* and Republic Asphalt Coated and Paved Pipe will. Like all Republic Drainage Products, these are made of heavy gage galvanized steel, corrugated for strength—and can be counted on to withstand constant impact, weight, and vibration of jet transport landings and take-offs.

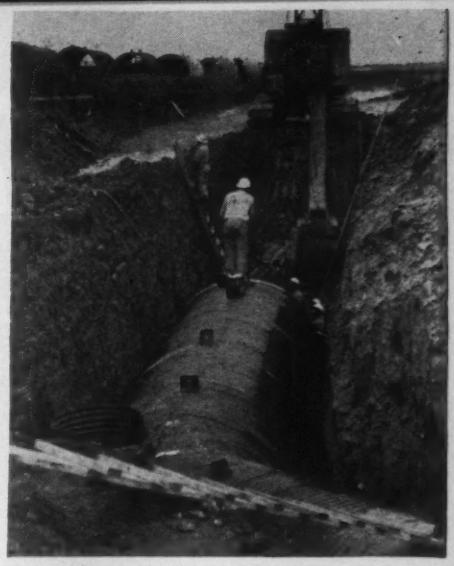
FREE-FLOW has been installed in large, storm capacity sizes for drainage of graded areas along runways. Under hangars and hangar aprons more Republic *FREE-FLOW* and Asphalt Coated and Paved Pipe is used. In addition, many hundreds of feet of Republic LOK-COR Subdrainage Pipe, Galvanized Corrugated Pipe, and Pipe-Arch have been placed under approaches to hangars to carry away surface and subsurface water.

Contractors installing Republic Drainage Products used at O'Hare found advantages in fast, easy installation. Simplified design assures rapid, correct assembly . . . prompt deliveries direct from Republic's Hammond, Indiana Culvert Plant, keep the job on schedule.

This is a big job . . . but Republic Drainage Products are designed and priced for the small ones, too. Whatever your next project, look up your Republic Distributor for pipe that goes down fast and stays down. For complete literature, address Republic Steel Corporation, Dept. EN-2244, 1441 Republic Building, Cleveland 1, Ohio.

REPUBLIC STEEL

REPUBLIC HAS THE FEEL FOR MODERN STEEL



Thousands of feet of Republic *FREE-FLOW* Sewer Pipe were installed at O'Hare with minimum labor and equipment costs. Largest diameter 96″ *FREE-FLOW* seen here is installed in the same manner as smaller diameters. Note lifting lugs for handling ease.

Ease of handling lengths of LOK-COR is demonstrated here. Pipe went in as fast as trenchers made the excavation—an important advantage in meeting an early 1962 completion date.

Here, a specially fabricated inspection hole is being installed in lengths of Republic LOK-COR, the drainage pipe that is helically corrugated for strength. The two-piece connecting band seen at right provides fast, positive joints.

Republic Drainage Products used in O'Hare Construction Project

RUNWAY DRAINAGE

Contractor: Consolidated Construction Co.—Chicago

Material: 1,100 feet of Republic *FREE-FLOW* and Asphalt Coated and Paved Pipe, 24″ through 96″.

600 feet of Republic Pipe-Arch.

TWA HANGAR

Contractor: Mayfair Construction Co.—Chicago

Material: 6,200 feet of Republic *FREE-FLOW* and Asphalt Coated and Paved Pipe, 12″ through 42″.

1,220 feet of Republic Pipe-Arch.

10,000 feet of Republic LOK-COR Subdrainage Pipe, 6″.

AMERICAN AIRLINES HANGAR

Contractor: Malan Construction Corp.—Chicago

Material: 6,900 feet of Republic *FREE-FLOW* and Asphalt Coated and Paved Pipe, 12″ through 42″.

675 feet of Republic Pipe-Arch.

8,000 feet of Republic LOK-COR Subdrainage Pipe, 6″ perforated.

UNITED AIRLINES HANGAR

Contractor: W. E. Schweitzer & Co.—Evanston

Material: 4,000 feet of Republic *FREE-FLOW* and Galvanized Corrugated Pipe.

300 feet of Republic Pipe-Arch.

13,000 feet of Republic LOK-COR Subdrainage Pipe, 6″, 8″, 10″.

NATIONAL GUARD HANGAR

Contractor: Mayfair Construction Co.—Chicago.

Material: 1,600 feet of Republic *FREE-FLOW* and Corrugated Metal Pipe, 8″ through 36″.

1,200 feet of Republic LOK-COR Subdrainage Pipe, 6″.

RUNWAY GRADING AND DRAINAGE

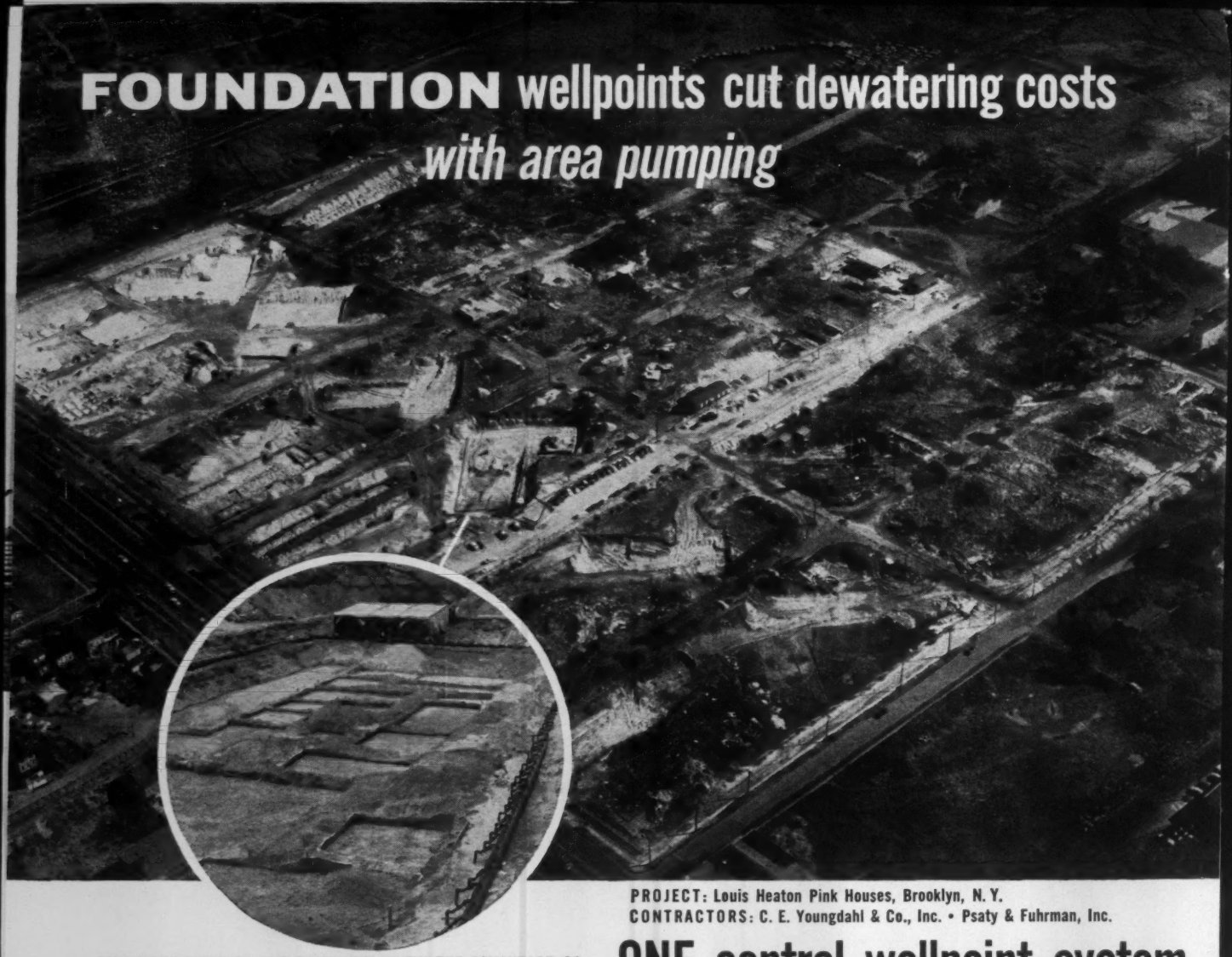
Contractor: S. J. Groves—Minneapolis

Material: 1,520 feet of Republic *FREE-FLOW* Pipe, 60″ through 96″.

Naess & Murphy: Architect—Engineer for City of Chicago.

Steel Strong, Modern, Dependable

FOUNDATION wellpoints cut dewatering costs *with area pumping*



PROJECT: Louis Heaton Pink Houses, Brooklyn, N. Y.
CONTRACTORS: C. E. Youngdahl & Co., Inc. • Psaty & Fuhrman, Inc.

ONE central wellpoint system dewaters 40 acres

Foundation wellpoints installed in a section of the job measuring 180′ x 130′ lowered the ground water 20′ in the immediate area and 7′ at the perimeter of the 40-acre construction site.

This method of area pumping reduced to a minimum the amount of equipment required for dewatering such a large area. It eliminated the cost of making numerous moves and reinstalling the wellpoint equipment over the construction site.

RESULT: The excavating contractor moved in weeks sooner than anticipated, and the entire job was completed 3 months ahead of schedule.

Careful soil analysis, sound engineering recommendations by practical construction men, along with dependable, efficient equipment made this accomplishment possible. It's typical of the kind of service contractors have learned to expect ... *and always get* ... from Foundation.

We carefully plan the solution of difficult dewatering jobs.

We solicit your invitation to serve or pre-bid with you on your next wet job.

THESE ARE SOME OF THE FIRMS WHO KNOW THE ADVANTAGE OF *FOUNDATION'S* AUTHORITATIVE, COMPREHENSIVE WELLPOINT SERVICE

Contracting & Material Co.	Natural Gas Pipe Line Muscatine, Iowa—Channaboro, Ill. to Chicago, Ill.
Diversified Builders Inc.	Missile Launching Complex Cape Canaveral, Fla.
George A. Fuller Co.	Prudential Life Insurance Co. Building Boston, Mass.
Peter Kiewit Sons Co.	Culverts and Bridge Abutments Indiana Toll Road
Robert E. Lee Co., Inc.	Flood Control, U.S. Engineers Hillsbough Canal, Fla.
Merritt Chapman & Scott Corp.	North Island, Norfolk Tunnel Norfolk, Va.
L. E. Myers Co.	Power Transmission Lines Northern Illinois Public Service Co. Chicago, Ill.
Gust K. Newberg Construction Co.	Ford Assembly Plant, Chicago, Ill.
Ragnar Benson Inc.	South Works, U.S. Steel Corp. Chicago, Ill.
Paul Smith Construction Co.	Tampa Municipal Hospital Davis Island, Tampa, Fla.
Spencer, White & Prentis Inc.	New England Bell Telephone Co. Bridgeport, Conn.
Stock Construction Corp.	Decontamination Center Pea Island, N. Y.

FOUNDATION | WELLPOINT CORPORATION

Solving dewatering problems for 35 years

38th Avenue and 10th Street, Long Island City 1, N. Y. Chicago, Illinois • Fort Pierce, Florida

OVERSEAS ASSOCIATES

MILLARS' MACHINERY COMPANY, LTD., London, England South Africa; Australia; India; Egypt; Spain; France; Malaya

Albert Fry Leaves TVA; Led Hydraulics Branch

Albert S. Fry, Chief of TVA's Hydraulic Data Branch, has retired from the TVA after 28 years of pioneering work in hydraulics. He was one of the original engineers who joined the TVA at its inception.

In his 28 years with the agency, Mr. Fry became internationally known as a leader in hydraulics and hydrology. His work has made TVA's Hydraulic Laboratory one of the most outstanding in the country. His lucid articles and reports on watershed hydrology, automatic rain and stream gages, reservoir sedimentation measurement, river forecasting procedures, and storm and flood investigation are landmarks in the literature on the subjects.

A University of Illinois graduate, he joined the Authority in 1933 after working on Mississippi River flood control for the Corps of Engineers. Before that he worked for the Morgan Engineering Co. in Memphis.

Mr. Fry was one of the organizers of the Mid-South and Tennessee Valley Sections of the ASCE and helped reorganize the Hydraulics Division of the ASCE. He was the moving force in the founding of the TENNESSEE VALLEY ENGINEER in 1940 and his editorials were influential in setting ASCE policy.

Mr. Fry, a registered engineer in Tennessee, plans to spend part of his time as a consultant in hydraulics, hydrology and the broad field of water resource development.

Briefs . . .

Business

Murton H. Willson has been appointed an associate in the architectural firm of Blurock, Ellerbroek & Associates, Corona del Mar, Calif., where he will head newly created department of community development and planning. He has been with William Pereira & Associates and Charles Luckman Associates in Los Angeles.

Sigmund F. Blum, head of the design department of Smith, Hinchman and Grylls Associates, Inc., has been made an associate of the firm. He came to SHG two years ago from Ketchum and Sharp, architects in New York City.

Matthew P. Susanke has been named vice president and general manager of Bevington, Taggart & Fowler, consulting engineering firm of Indianapolis. He was for 22 years the chief engineer of the Indiana Rating Bureau.

Seymour Zubkoff has left the De-Long Corp., New York City consultants, to join the staff of Hydrotechnic Corp., consultants for water resources, hydraulic and sanitary engineering, also of New York City. He will go to Saigon, Viet Nam, to work on the city's water supply project.

P. J. Soukup has been named project manager for the Morrison-Knudsen-sponsored joint venture building Yellowtail Dam and powerhouse in Montana. He comes to Yellowtail from Greers Ferry Dam in Arkansas, where he was also project manager for that M-K-sponsored joint venture. **Russell E. Martin,** who was project engineer on Greers Ferry, will also go to Yellowtail to be project engineer there.

William C. Overman, since 1958 an associate with Norfolk, Va., consulting engineers Langley and McDonald, has been made a partner of the firm.

Carl C. Bankemper has opened the architectural office Carl C. Bankemper & Associates at 319 Scott St., Covington, Ky. He is a registered architect in Kentucky, Ohio, Illinois, Michigan and Wisconsin.

F. Phillip Brotherton and **Jack D. Train** have been made partners of the Chicago architectural firm of Perkins & Will. Mr. Brotherton taught at the University of Illinois before joining the firm in 1954; Mr. Train, who joined the firm last November, had been an associate with Skidmore, Owings & Merrill, Chicago.

Associations

The American Association of Cost Engineers has elected **Cecil H. Chilton,** editor of McGraw-Hill's CHEMICAL ENGINEERING, as their president. The group went international at their last convention by granting charters to chapters in Montreal and London.

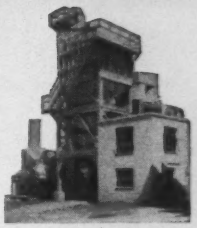
Charles P. Weisz has been appointed structural engineer for the Wire Reinforcement Institute. For the past nine years he has been in charge of plan preparation for Hazelet & Erdal, Cincinnati consulting engineers.

Lee T. Purcell, Paterson, N. J., consulting engineer, has been elected president of the New Jersey State Board of Professional Engineers and Land Surveyors. The five-member board examines and licenses professional engineers and land surveyors in the state.

B. G. Ballard has been elected president of the Engineering Institute of Canada. He is vice president (scientific) of the Canadian National Research Council.

POSEY

IROQUOIS ASPHALT PLANTS



Complete batch type Asphalt plants with capacities from 50 to 240 tons per hour — hot-cold mix. New automated design enables complete plant to be operated by one man.

For FREE 22-page illustrated catalog, write:

POSEY IRON WORKS INC

Custom Fabrication For Over 50 Years

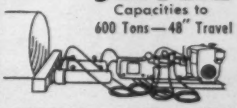
DIVISIONS:
• Iroquois Asphalt Plants • Mixers and Blenders
• Tunnel Forms • Industrial Heating • Foundry
• Large OD Steel pipe

561 S. PRINCE STREET LANCASTER, PA.

ELGOOD

Hydraulic & Mechanical JACKS

Capacities to 600 Tons—48" Travel



Jacking Equipment for
Pipe Pushing
Erection
Pile Driving
Pile Testing
Slip Forms
Tunnel Shields
Prestressed Concrete
many other applications

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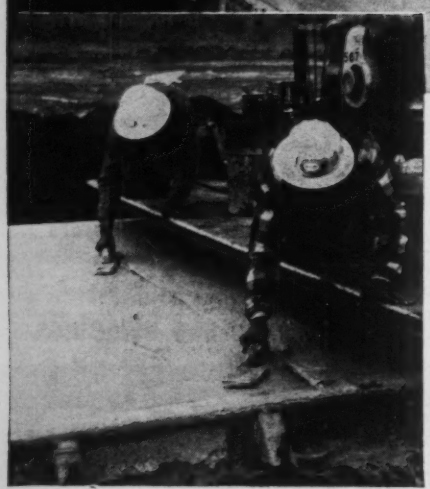
Structural Steel
BRIDGES and BUILDINGS
General Office and Shops
PHOENIXVILLE, PA.
Subsidiary—Phoenix Steel Corporation

TRUCK MIXERS distributed concrete in uniform piles to facilitate single-pass spreading of 9″ paving slab. Longitudinal joint between 12′ lanes was formed by insert fastened to right rail. Contractor: Duval Engineering & Construction Co., Jacksonville, Fla.



OVERHEAD FRAME is pushed down to force asphalt filler strip from holding device into place in wet concrete. Smooth, even joint, without spalling, was formed later by sawing out top 1″ of filler and sealing with plastic.

AFTER STRIP WAS PLACED, machine was hand-cranked ahead to permit 2-man crew to hand-finish area around joint. Then rig moved 20′ to next dowel joint location and placed next strip.

Joint fillers inserted as they paved

On a section of Interstate 10, near Jacksonville, Fla., the usual paving train of spreader, finisher and float was immediately followed by a job-built two-man machine that placed and vibrated in ¼″ wide x 2″ deep asphalt-impregnated joint strips in the wet concrete.

This rig was hand-cranked along the forms to previously set dowel-joint locations. The filler strips were hydraulically driven into the concrete with enough vibration to displace the aggregate. Then the machine moved ahead to let the two-man crew hand-finish the joint before final surface finishing and burlap drag.

After the concrete cured, it was only necessary to saw out 1″ of the soft asphalt filler and pressure-seal the joint with plastic, a clean, low-cost operation.

A fleet of 7-yd. truck mixers delivered concrete to the subgrade to complete a full 9″ x 12′ unreinforced slab with a single spreader pass. The job required about 1,800 linear feet of 9″ forms to keep forms ahead of the paving train.

Concrete was processed to rigid Interstate highway requirements and delivered on exact schedule by truck mixers of certified design, capacity, mixing speed and water control accuracy.

NRMCA
7 CUBIC YARD
MIXER
MAXIMUM CAPACITY
CERTIFIED BY THE TRUCK MIXER MANUFACTURERS BUREAU TO COMPLY WITH ITS STANDARDS FOR TRUCK MIXERS AND AGITATORS AS APPROVED BY THE N.R.M.C.A.
9 1/4 CUBIC YARD AGITATOR
UNLESS RATED LOWER ON THE MANUFACTURER'S DATA PLATE

You have a right to insist on this Rating Plate. It certifies compliance with the high industry standards which are maintained for your protection by the

TRUCK MIXER MANUFACTURERS BUREAU

Blaw-Knox Company
Pittsburgh, Pa.
Chain Belt Company
Milwaukee, Wis.
Challenge—Cook Bros., Inc.
Los Angeles, Calif.
Concrete Transport Mixer Company
St. Louis, Mo.
Construction Machinery Company
Waterloo, Iowa
Hercules Galion Products, Inc.
Galion, Ohio
The Jaeger Machine Company
Columbus, Ohio
The T. L. Smith Company
Milwaukee, Wis.
Whiteman Manufacturing Company
Pacoima, Calif.
Willard Concrete Machinery Co., Ltd.
Lynwood, Calif.
Worthington Corporation
Plainfield, N. J.

Obituaries

Alan G. Stanford Dies; Past President of NSPE

Alan G. Stanford, vice president of Robert & Co. Associates, Atlanta architects and engineers, has died. He was 67 years old.

Mr. Stanford served as president of both the National Society of Professional Engineers and the National Council of State Boards of Engineering Examiners.

In 40 years with the Atlanta firm he has worked on many large industrial and commercial projects both in this country and overseas. He served as project manager in the design and construction of the huge aircraft assembly plant at Marietta, Ga. now occupied by Lockheed Aircraft Corp.

He directed the engineering services furnished by the Corps of Engineers in developing housing and garrison facilities at Guam and he was in charge of the company branch office that designed the Naval Air Training Station at Corpus Christi, Tex.

Brig. Gen. Theodore H. Dillon, 78, retired deputy chief of the Army Transportation Corps. A 1904 graduate from West Point, General Dillon left the service after World War I to teach. He was recalled in 1941 and was assigned deputy chief of the newly created Transportation Corps. In 1948, a year before he retired, he was made director of engineering of the Atomic Energy Commission.

Edmund A. Pratt, 74, retired consulting engineer. A specialist in bridges, roads and airports, Mr. Pratt worked for many years as the overseas representative of Barber Asphalt Corp. of New Jersey. In 1954, he was appointed a consultant to the New Jersey State Highway Department.

Harry A. Wortham, 75, retired vice president of the Struck Construction Co., Louisville, Ky. During the thirties, Mr. Wortham was Southeastern Region director of the Works Projects Administration.

Charles H. Higgins, 82, an architect in New York City and one of the designers of the United States Building at the Paris Fair of 1937. He had practiced under his own name almost continually since his graduation from the Columbia School of Architecture in 1911. Mr. Higgins was a past president of the New York Chapter of the American Institute of Architects.

Niagara Power Project...Western World's Biggest...Using

FLEXCELL

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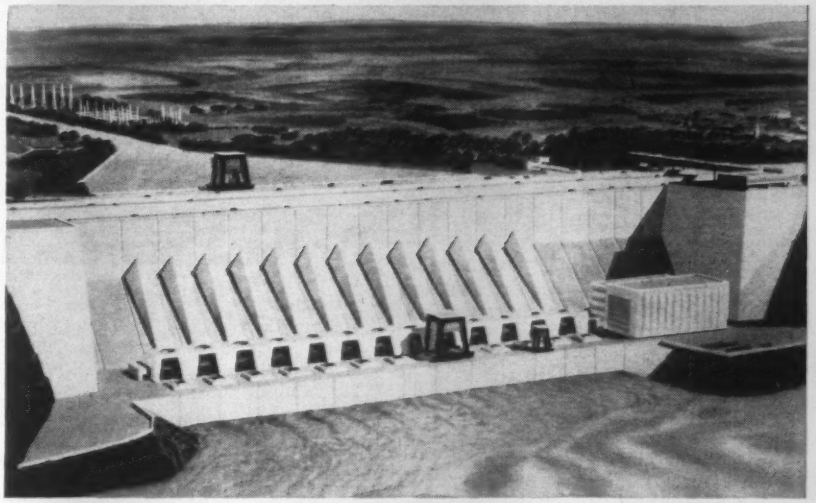
BITUMINOUS IMPREGNATED FIBERBOARD



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FLEXCELL joint filler, by Celotex, is being used on the $720,000,000 Niagara Power Project (3,500,000 cubic yards of concrete) in the two generating plants and parkway.

On your next project, specify Flexcell famous non-extruding fiber joint filler that comes to the job "right and ready"... cut-to-shape, accurately punched, ready to use.

Does the job best!

Over 25 years of job-proved performance have made Flexcell board "1st Choice Across America!" Resilient, yet tough, rigid, non-extruding... dimensionally stable. Water-resistant. Not affected by heat or cold. Economical, efficient, easy-to-use!

Your Flexcell board distributor is equipped to fabricate shapes and strips to your specifications. Call him, or write for samples and name of your nearest Distributor.

Flexcell board is "1st Choice" for... highways • bridge approaches • intersections • abutments • dams • walks • curbs • gutters • streets • driveways • slab floors • roof decks • and for vibration isolation under heavy machinery—plus many other uses.

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Construction After World War III

ON THERMONUCLEAR WAR—By Herman Kahn. Princeton University Press, Princeton, N. J. 668 pages. $10.

The construction industry will have plenty of work if the government adopts the programs proposed by Herman Kahn, a toughminded Rand Corp. physicist who has been studying the logistics of thermonuclear war for the past 12 years. The big civil defense program needed to maximize our chances of survival will naturally increase the prospects of a postwar construction boom rebuilding the ruins.

This optimistic outlook for construction just about exhausts the good news in Mr. Kahn's long book. If this book quickens the beat of faint hearts that recoil from the thought of thermonuclear war, it may stop even fainter hearts that don't want to pay what Mr. Kahn considers the price of survival.

Mr. Kahn urges the federal government immediately to undertake a $500-million civil defense program (not far above the Administration's $350-million proposal). It would finance purchase of radiation meters, research and development of shelter programs, prototype shelters and use of existing structures for fallout protection. As part of a $200-billion non-military defense program for the period 1961-75, he estimates that $75 billion could buy us underground shelter spaces to accommodate 200 million persons. One quarter of these shelter spaces would be built 1,000 ft underground in concentrated city areas; another quarter would be located in small cities and suburbs; and the remaining half would comprise 100 million spaces through the outlying and rural sections of the country.

Mr. Kahn argues that such serious civil defense preparations could dramatically reduce U. S. casualties in an atomic attack. For example, he estimates that a massive attack that would kill 160 million unprotected Americans would kill only 70 million with "minimum fallout" protection, or 15 million with a "complete" civil defense program and hardened Strategic Air Command bases.

How long would postwar urban renewal take? Mr. Kahn predicts that ". . . we would rebuild the cities that had been destroyed (complete with slums, and some extra ones) in less than ten years."

Charging that technical progress in the protective-construction field lags far behind the need, Mr. Kahn aims a critical blast of several kilotons at the structural engineering profession for its failure to promote bomb-shelter research and construction. He claims that bomb-shelter construction has lagged because the building industry is not a "romantic" field and because "it is dominated by certain relatively unimaginative engineering groups." Architects and engineers have waited for government leadership instead of "pushing the state of the art," he maintains.

The author urges creation of a new field in protective construction, warning that engineers will have to go to school to perfect the technology of designing installations "hard" enough to withstand blast pressures up to 500 psi from superbombs up to 100 megatons.

Brain Primers for P.E. Exams

STRUCTURAL ENGINEERING FOR PROFESSIONAL ENGINEERS' EXAMINATION.—By Max Kurtz. 348 pages. McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y. $9.00.

This book goes somewhat beyond the usual review for professional engineers' examinations. The author has supplied a tersely written text as a skeleton frame for the book. The flesh consists of sample problems (with solutions) culled from professional engineers' examinations in many states.

The scope of the book also goes beyond the subject matter suggested by the title. Mr. Kurtz declares as his objective preparing the reader for structural and civil engineering parts of the professional engineers' examinations. Accordingly, the book contains chapters on hydraulics, soil mechanics, surveying, retaining wall design, and water supply and sewerage.

The more intensive chapters on structural design and analysis include an elementary review of statics, truss analysis, steel, timber and reinforced concrete design, cylinders under fluid pressure and analysis of indeterminate structures by moment distribution and the conjugate-beam method. The appendixes treat subjects often encountered on examinations; e.g., constructing and analyzing a parabola.

1301 REVIEW PROBLEMS FROM EIT AND ENGINEERING REGISTRATION EXAMINATIONS—by R. C. Brinker, J. J. Bourquin, P. C. Hassler, J. A. Whitacre, Jr., P. W. Young 388 pages. International Textbook Co., 1001 Wyoming Ave., Scranton 9, Pa. $7.50.

This volume contains numerous problems obtained from actual engineer-in-training and professional engineers' registration examinations. Most of the professional-level problems concern the more general fields—civil, electrical and mechanical. But problems in aeronautical, industrial and mining engineering also appear.

The authors divide their book into three sections: Fundamentals, Applied Engineering, and Typical Examinations. The Fundamentals section contains the material on physics, strength of materials, thermodynamics and other basic engineering sciences. It also has problems on engineering economics, ethics, and contracts and specifications. The last section comprises nine complete examinations. Two of these test the candidates' basic scientific and engineering knowledge (the engineer-in-training level); six test him at professional level in a specific branch; and the last embraces all engineering branches.

Prestressing Treatise

PRESTRESSED CONCRETE DESIGN AND CONSTRUCTION—By James R. Libby. 468 pp. The Ronald Press Co., New York 10, N. Y. $12.50.

Engineers and contractors will find Mr. Libby's book an invaluable source of information on prestressed concrete. It is authoritative and thorough.

The author explains the basics clearly and briefly. Starting off with a general description of prestressing methods and materials, he jumps right into design for bending and computation of cracking loads, ultimate moment, shear and bond. The theoretical treatment concludes with design for continuity in prestressed beams and design of members subject to direct stresses.

On the practical side, Mr. Libby details various framing systems that have been used for buildings and bridges. He also discusses equipment and procedures for pretensioning and post-tensioning. And he concludes with a description in depth of prestressing plant facilities and fabrication.

Low concrete prices help take . . . . .

Nevada Freeway Contract

This 11.5 mile section of Interstate 80 northeast of Lovelock drew five bids. The contract for $1,995,869 went to Dodge Construction Inc., Fallon, Nev. This is 2.8% under the second low bid by Wells Cargo, Inc., Las Vegas, and 11.6% below the high. W. O. Wright is state highway engineer and Stanley D. Sundeen is office engineer at Carson City.

The new dual 38-foot plantmix travel lanes, separated by an 84-foot median, will lie west of the 40-foot road for the first six miles when they swing east to follow existing alignment. The new freeway will have 2-ten foot and 2-four foot shoulders, also a diamond-type interchange and several large drainage structures.

Prices for 1,810 cu yd of drainage excavation ranged from a low of $0.29 to a high of $3.00 a yard; 598,810 cu yd of roadway excavation went under contract at $0.30 a yard, but drew bids ranging upwards from a low of $0.29 to a high of $0.43.

Class AA concrete bids for 2,331 cu yd ranged from a low contract price of $57.50 to a high of $66.00. Prices for 368,300 lb of reinforcing steel ranged from $0.11 to $0.15, but the two lowest bidders each bid $0.13 a pound.

Corrugated metal pipe prices ranged from a low of $6.00 to a high of $7.00 a foot for 1,277 lin ft of 24 in. pipe, from $7.00 to $8.00 for 342 ft of 30 in., from $9.50 to $12.50 for 860 ft of 36 in., and from $14.00 to $17.00 for 398 ft of 48 in. pipe. All of the prices were for dipped corrugated metal pipe. Galvanized steel pipe, 1½ in. I.D., jumped from a low bid of $1.00 to a high of $3.00 for 1,980 lin ft.

Gravel base, type 1, ranged from $0.68 to $0.95 a unit for 225,700 tons; and type 2, from $0.88 to $1.07 for 141,290 tons.

All materials will be furnished by the contractor. Class AA concrete will have a minimum compressive strength of 3,000 psi at 28 days, and approximately 510 lb of aggregate will be used per bag of cement.

Materials will be brought to the construction site by rail and highway. The railhead is adjacent to the new highway section.

Wage rates include: skilled labor, $3.375/hr; semi-skilled, $3.15; and common, $3.05.

The bidding included:

1C	Dodge Const., Inc., Fallon, Nev	$1,995,869
2	Wells Cargo, Inc., Las Vegas, Nev	2,053,401
5	R. A. Westbrook, Inc., & Morrison-Knudsen Co., Inc., Sacramento, Calif	2,258,777

Bids: 5-18-61 Items	Unit	Quantity	Unit 1C	Prices 2
Signs	ls	job	$10,000	$13,000
Grader, motor	hr	75	15.00	15.00
Tractor crawler, w/scraper w/dozer & /or ripper	hr	100	20.00	20.00
	hr	25	20.00	20.00
Pipe, culv, remove	lf	1,484	2.00	1.00
Fence, remove	lf	39,920	0.10	0.07
Headwalls, remove	ea	46	20.00	10.00
Exc, roadway	cy	598,810	0.30	0.38
drainage	cy	1,810	0.50	0.30
channel	cy	84,980	0.30	0.28
Ditches, V-type	sta	150	7.50	7.50
Borrow	cy	48,050	0.30	0.30
Overhaul, stay	stay	1,823,910	0.01	0.005
yml	yml	141,495	0.12	0.12
Exc, str	cy	5,890	1.50	3.00
Backfill	cy	9,010	1.50	3.00
Fill, fdn	cy	2,490	3.00	4.00
Water	Mgal	51,500	0.25	1.00
equip, furn	ls	job	87,500	120,000
Roller, power	hr	370	10.00	9.00
pneumatic-tired	fhr	27,140	0.60	0.60
tamping	hr	2,530	15.00	13.00
Gravel, base, tp 1	t	225,700	0.86	0.75
tp 2	t	141,290	0.92	0.92
Base, select mat	t	333,470	0.66	0.50
Liquid asph, tp MC-1	t	816	37.50	33.00
tp MC-2	t	156	36.00	33.00
tp SC-3	t	733	35.00	33.00
Asph, emul, tp MS-1, dilut	t	126	37.50	35.00
tp RS-2	t	435	35.00	32.00
Screenings, ¾"	t	3,475	4.00	4.00
Aggregate, roadmix surf	t	12,220	1.00	0.75
Roadmix, roadbed 18'	mi	6.53	600.00	700.00
24'&26'	mi	2.68	750.00	850.00
intersections	sy	350	0.50	0.30
Asph cmt, 120-150 penetrat	t	6,848	31.25	30.00
Aggregate, plantmix surf	t	114,125	2.40	2.50
Ditches, plantmix paved	sy	30	2.00	0.60
Shoulder dike, plantmix	lf	6,360	0.25	0.20
Conc, cl AA	cy	2,331	57.50	65.00
Steel, reinf	lb	368,300	0.13	0.13
Mesh reinf	sy	890	1.00	1.00
CMP, dipped, 24"	lf	1,277	7.00	6.00
30"	lf	342	8.00	8.00
36"	lf	860	12.50	11.00
48"	lf	398	17.00	16.00
arch, dipped, 22"x13"	lf	130	5.50	5.00
29"x18"	lf	108	7.50	7.00
36"x22"	lf	628	9.00	8.00
42"x27"	lf	1,290	13.50	12.00
nestable, dipped, 8"	lf	370	3.50	5.00
Pipe, str plate, 8 plates, dipped, 162", 10ga	lf	104	95.00	105.00
8ga	lf	50	105.00	115.00
5ga	lf	98	125.00	135.00
3ga	lf	164	135.00	145.00
Protectors, embnkmnt, dipped, tp 3	ea	3	50.00	32.00
CMP, dipped, downdrain, 8"	lf	198	3.00	2.50
Joint, slip	ea	3	35.00	25.00
Anchor assembly	ea	18	35.00	13.00
Castings	lb	135	1.00	0.75
Grates, str steel	lb	213	0.40	0.30
Riprap, grouted	cy	39	35.00	25.00
Conc, cl AA, slope paving	cy	104	45.00	45.00
Fence, const, tp A-5B	lf	123,310	0.36	0.36
tp A-832-3B	lf	2,250	0.65	0.42
Gate, met drive, 16'	ea	5	100.00	55.00
Guard rail, std steel	lf	528	3.00	3.00
Markers, culv,&posts, guide	ea	760	8.00	5.50
right-of-way	ea	15	8.00	7.50
Monuments, reference	ea	77	10.00	9.50
Signs, permanent	ls	job	12,500	18,000
Cattle guard, std steel, 20'	ea	2	2,250	2,000
26'	ea	2	2,750	2,000
wings	ea	4	125.00	95.00
Asph, emul, tp MS-1, backslope treat	t	93	50.00	45.00
Pipe, galv steel, ID, 1½"	lf	1,980	2.00	3.00

Completion time: 300 working days
Liquidated damages: $700 per working day

ENR Construction Cost Index (1913=100) 20-cities average —847.32

New book tells
Where . . .
How . . .
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Written for bar setters and inspectors . . . as a manual for apprentice courses . . . and a reference for specification writers, architects, engineers, and detailers.

Contains complete specifications and instructions for placing reinforcing bars, welded wire fabric, and their supports.

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"NEITHER RAIN NOR SNOW NOR DARK OF NIGHT . . . ."

But often forgetting the postal zone number when you address an envelope can delay your letter long enough to miss the appointed round. There are 106 cities in America where a complete address includes a zone number. Always use it when writing to or from these cities.

Materials Prices

Monthly Market Quotations by ENR Field Reporters

See following ENR Issues for OTHER PRICES:

- Iron & Steel Products, Pipe: Last, July 13; Next, Aug. 17
- Wood Products, Glass, Explosives, Chemicals: Last, July 20; Next, Aug. 24
- Clay Products, Limes, Plaster, Paint, Roofing: Last, July 27; Next, Aug. 3.
- Wage Rates, Building Board, Lath, Insulation: Last July 6; Next, Aug. 31.

CEMENT, AGGREGATE, READY MIXED CONCRETE - F. O. B. CITY

Item	Quantity	Unit	Atlanta	Baltimore	Birmingham	Boston	Chicago	Cincinnati	Cleveland	Dallas	Denver	Detroit	Kansas City	Los Angeles	Minneapolis	New Orleans	New York	Philadelphia	Pittsburgh	St. Louis	San Francisco	Seattle	Montreal	†Toronto
Cement, Port., bulk	CL	bbl.	$3.69a	$3.91a	$3.50cf	$4.53ap	$4.02ag	$4.34c	$3.89	$3.46a	$4.39a	$3.91agq	$3.97a	$4.71c	$4.17a	$3.65b	$4.20a	$4.31fae	$4.62bj	$4.09a	$3.85c	$3.75ag	$2.96de#	$3.84t
paper	"	"	4.32a#	4.42a	4.43c	5.83ap	4.52ag	4.84c	4.77#	3.90a	4.89a	4.24a	4.52a	4.15c	4.68a	4.17b	4.71a	4.51#ae	5.65bjk	4.59a	4.42c	4.47#a	3.26#de	4.00i
mortar	"	"	3.64a#	3.56a	.....	4.90imp	4.15g	4.32c	4.19#ae	3.78a	4.89	4.29a	4.30a	4.65c	4.26a	3.97b	3.77a	3.63#e	5.00bjl	4.29a	4.86c	4.65a	3.31#de	4.00i
Gravel, 1½"	"	ton	2.25s#	2.80a#	2.53ns	3.00qsz	3.78#e	2.29#eu	2.25ae	2.55#a	.....	2.30#abm	.....	2.55#at	2.70#ae	2.61b	.....	1.95#a	3.08#aqv	1.50#as	2.02	4.25#bm	1.90#a	2.40
¾"	"	"	2.50s#	2.80a#	2.53ns	3.00qsz	3.78#be	2.34#eu	2.25ae	2.60#a	2.15#	2.55#abn	.....	2.76#at	2.70#ae	2.61b	3.20bk	1.95#a	3.08#aqv	3.50#as	2.02	4.25#bm	2.15#a	2.40
Sand	"	"	2.00s#	2.25a#	2.13ns	3.00qsz	4.13#be	2.44#eu	1.75ae	1.65#	1.42#b	2.15#abn	1.70#a	2.41#at	1.60#ae	2.16#b	3.50bkw	1.55#a	3.08#aqv	2.50/3.50#as	2.12	4.25#bm	2.40#a	2.05
Crushed stone, 1½"	"	"	3.10s	2.85a#	2.75s	1.75qsz	3.95#be	2.55#eu	2.70ty	2.57	.....	2.30#abn	2.10#a	2.41#at	4.00#ae	.....	2.85blbb	2.00#a	2.33#aqv	1.75js	2.17	4.50#bm	1.90#	2.40
¾"	"	"	3.10s	2.90a#	2.75s	1.85qsz	3.95#be	2.74#eu	2.70ty	2.77	3.00#x	2.30#abn	2.10#a	2.46#at	4.00#ae	.....	2.85blbb	2.30#a	2.03#aqv	1.75js	2.17	4.50#bm	2.15#	2.40
Crushed slag,* 1½"	"	"	3.90r	2.05a#	1.95d	.....	2.25#e	1.80u	2.30#f	.....	.....	3.10aqaa	.....	.....	.....	1.95d	.....	2.25#a	2.10w	1.80	.....	.....	2.00	2.40
¾"	"	"	3.90r	2.00a#	2.05d	.....	2.25#e	1.80u	2.30#f	.....	.....	3.50aqaa	.....	.....	.....	2.05d	.....	2.35#a	2.10w	1.85	.....	.....	2.00	2.40
Concrete block, 8"x8"x16"																								
Sand/gravel	TL	ea	0.19o	0.18a	0.19	0.24o	0.26#e	0.19o	.....	.....	0.25	0.24u	0.22a	0.175f	0.20q	0.25r	0.276no	.....	0.22rx	0.26#o	0.24	0.288s	0.20	0.26
Lt. wgt. agg	"	"	0.225o	0.18a	0.19	0.305ao	0.26#be	0.25ao	0.24f	0.255	0.27ao	.27#au	0.27c	0.25	.....	0.25	0.32bo	0.20	0.22rx	0.32#co	0.28cl	0.384cs	0.28t	0.30cu
Concrete, ready-mix'r		cy	13.00g	13.50ou	14.75q	15.00q	13.00–13.50e	15.00gr	17.25u	11.50x	11.90	15.50eaa	13.50	12.46hlx	14.55f	14.25o	17.60ay	13.90z	16.15o	13.65/14.10q	12.50cw	14.70j	10.80ek	11.75q

Delivered. * F.o.b. plant. ** Add 4% sales tax ## Add 2% Intrastate sales tax. R Revised. † Plus 6% Mun & Prov tax.
CEMENT: •a Less 10¢ disc. 15 days. •b Less 2% disc. 15 days. •c Less 10¢ disc. 10 days. •d 10¢ disc. 20 days. •e Truckload lots. •f Fob mill, add $14.98 to $21.31 per car switching charges. •g fob mill + freight. •h LCL. •i Less 2% disc. 10 days. •j Truck lots, fob yard. •k 10u bag lots. •l over 150 sacks. •m Sold in bags only. •n Less 5% disc. 30 days. •o Plus 50¢ for Sat. del. •p 5–8 ton truckload. •q F.o.b. mill •r 50 cy & over •s In bags & bbl. Only. •t min. 7 tons
SAND, GRAVEL, STONE & SLAG: •a Truck lots. •b Per cu. yd. •c 5 tons up. •d Less 5¢ disc. 10 days. •e Less 2% disc. 10th. •f Less 2% disc. 15th. •g Less 5% for cash. •h Less than 5 tons. •j F.o.b. quarry. •k Barge lots asd. •l F.o.b. scow Hudson river. •m Less 2% for cash. •n F.o.b. cars. •o F.o.b. yard. •r less 5% disc. 15th. •s Less 2% disc. 10 days. •t Less 10¢ disc. 10 days. •u Less 5¢ disc. 10 days. •v Less 2% disc. 15 days. •w Less 10¢ disc. 15 days. •x Incl. 35¢ switch charge. •y F.o.b. dock. •z 5–8 tons. •aa Less 5% disc. 15 days. •bb Less 2% 25th of month

CONCRETE BLOCK: •a Cinder. •b Waylite. •c Haydite. •d Celocrete. •e 5¼ x 8 x 12 in. •f 8 x 4 x 16 •g F.o.b. truck at job. •l F.o.b. plant San Rafael. •m F.o.b. yard. •n 8 x 8 x 18. •o Less 2% disc. 10 days. •p Less 2% disc. 10th, •q Less 5% disc. 10th. •r Less 2% disc. 15 days. •s Less 2% disc. cash. •t Siporex, 7 x 8 x 18. •u Less 5% disc. 10 days. •v Less 12% disc. 15th.
READY MIXED CONCRETE: •a 6 cu yd or over del. Man. •b 25 cu yds or more. •c 10–100 cy. •d 1-3 mi. zone add 15¢ for ea. add'l 1-mi. zone. •e 3,000 lb comp. •f 2,500 lb. comp., less 5% disc. 30 days. •j Less 25¢ disc. 15 days. •n Less 50¢ for cash. •i 5% off for cash. •j 2% off for cash. •k Federal tax included. Add 6% mun. & prov. tax. •l 1:2½:3½ base price. •m F.o.b. yard. •n Plus escalator clause. •o Less 2% disc. 15 days. •p Less 50¢ disc. 15 days. •q Less 2% disc. 10 days. Add 50¢ per zone. •r 2000 wgt. •s Less 5% disc. 10 days. •t Incl. 50¢ heating. •u Less 2% disc. 15th •v Sat. del. +50¢. •w 10-100 cy. •x Del in zone 20-B. •y less 25¢, 10 days. •z less 1% in 30 days. •aa 6 bag mix

MILL PRICES FOR BULK CEMENT: Subject to 10¢ discount, 15 days. For paper bags add 50¢ per bbl., not refundable. *Prices guaranteed through December 31, 1961*

Richard City, Tenn	$3.55	Bath, Pa	$3.50	Northampton, Pa	$3.50	Leeds, Ala	$3.40	Howes Cave, N. Y.	$3.50	Oswego, N. Y.	$3.60	Green Bay, Wis	$3.60
Clinchfield, Ga	3.55	Lesley, Pa	3.50	Universal, Pa	3.60	Duluth, Minn	3.60	Muskegon, Mich	3.55	Cleveland, O	3.65	Fronton, O	3.65
Kingsport, Tenn	3.55	Buffington, Ind	3.55	Waco, Tex. (+ 10 tax)	3.35	Hudson, N. Y.	3.50	Saginaw, Mich	3.60	Alsen, N. Y.	3.50	Montreal, Canada (a)	2.80
West Des Moines, Iowa	3.65	Independence, Kan	3.35	Giant, S. C.	3.55	Alpena, Mich	3.50	Wyandotte, Mich	3.60	Toledo, O	3.60	W. Winfield, Pa	3.60
Nazareth, Pa	3.50	Hannibal, Mo	3.55	Steelton, Minn	3.60	Detroit, Mich	3.60	Buffalo, N. Y.	3.55	Milwaukee, Wis	3.60	Security, Md.	3.50

•a 350 lb. bbl.

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS - F. O. B. CITY

Item	Quantity	Unit	Atlanta	Baltimore	Birmingham	Boston	Chicago	Cincinnati	Cleveland	Dallas	Denver	Detroit	Kansas City	Los Angeles	Minneapolis	New Orleans	New York	Philadelphia	Pittsburgh	St. Louis	San Francisco	Seattle	Montrea	Toronto
Paving brick, block-																								
Brick, 3"x4"x8½"	CL	M	.....e	.....e	.....e	.....e	$150.00#ab	.....e	.....e	.....e	.....e	.....e	.....e	.....e	.....e	.....e	.....e	.....e	$60.00k	.....e	.....e	.....e	.....e	.....e
Granite, 4"x4"x8"	q	M	.....e	.....e	$66.00i	.....e	95.00#a	.....	89.50	40/80	62.00a	$114.00	.....	.....e	.....e	.....e	.....e	.....e	95.00n	.....e	$70.00	.....e	.....e	$120.00f#
Wood, 3½" 16 lb.	...	sy	.....e	.....e	.....e	.....e	3.95/4.00aj	.....e	6.30	.....e	.....e	.....e	.....e	.....e	.....e	$3.73 e	$3.70f	.....e	6.35n	.....e	.....e	.....e	.....e	4.50f
Asphalt, paving																								
Tank car	CL	ton	$0.1182W	$21.00	25.12 O	$22.00apS	22.00b	$26.00SU	26.00tA	26.90	.....	31.00#	$18.75cl	$18.00dmx	23.70	$20.00e	22.90mO	0.21u	31.20isv	$19.74	22.50gdd	$24.00z	$30.50n	38.90
Drummed	CL	gal.	0.1220W	.....	25.69	46.00apS	32.00b	.....	.....	46.35	.....	.....	.....	.....	.....	.....	67.83mO	.....	.....	21.65	41.00gdd	47.00h	43.60n	59.01ee
Asph. binders, fluxes																								
Tank car	CL	gal.	0.1182W	0.9i	0.1069	22.00avS	20.40bv	26.00ffv	26.00tvA	.1138	.....	31.00#	18.75cv	18.00dvx	23.70	20.00ev	22.90vtO	0.21u	31.20isv	1825f	22.50gkvdd	33.00vscc	0.167n	0.2135ee
Drummed	CL	gal.	0.1220W	0.18i	0.1093	46.00avS	30.40bv	.....	.....	.1983	.....	.....	.....	.....	.....	.....	67.83vtO	.....	.....	1825	40.00gkvdd	38.50	0.211n	0.2367w
Asph. cutback, MC																								
Tank car	CL	ton	0.1222W	0.9i	0.1163w	0.105awF	.10bwH	0.1165twAF	0.1165wSU	30.50	.....	30.24wl#	.0825cwJ	19.50dKx	0.105w	0.095ew	10.16uF	0.095U	0.1403#S	.09f	22.50gNdd	25.50KE	17.80nuE	0.18wee
Drummed	CL	gal	0.1258W	0.18wE	0.11880w	0.22awF	.18bwH	.....	.....	52.45	.....	.....	.....	.....	.....	.....	29.62uF	.....	.....	.092fw	43.50gNdd	.....	22.20nuE	0.235
Road oil, tank car	CL	gal	.....	0.95i	0.1006O	0.14aOR	.08b	0.109	.....	.1100	.....	27.84v	.06751c	18.50dvaa	0.95	0.085eB	.....	0.095U	0.14#S	.165f	23.25gvWdd	28.75hvY	0.155n	0.191w
Asph. emul. RSI																								
Tank car	CL	gal.	0.1288W	0.10i	0.1069	0.15OR	.....	0.1265	.....	0.1138	.....	0.152	.10	21.40jXv	0.137bb	0.095eBL	10.15u	.....	0.1403i	.18250	23.50gvXdd	25.80hvX	0.242n	0.204Zee
Drummed	CL	gal	0.1327W	0.19i	0.1093O	.....	.....	.....	0.21A	0.1983	.....	0.29	.....	.1842jXv	.....	0.1905eB	29.81u	.....	.....	.30	.2023gXdd	49.80hrvX	0.27nX	.26Zee

PAVING BRICK & BLOCK: •a Less 2% disc. 10th. •b 3 x 3¾ x 8. •c 2¼ x 8 x 4. •d Truckload lots. •e Not used. •f 2" interior 6 lb tr. •g Less $1 w/disc. 15th. •n 2" tr. 8 lb. •i 3 x 3½ x 8½. •j 2½", 6 lb. tr. •k Used. •l Redshale. •m Pine; oak $6.57. •n Prices del. •o Less $1 M disc. 15 days. •p Used: $40; new: $80. •q Lots of 50M.
ASPHALTS: •a F.o.b. refinery, Everett, Mass. •b F.o.b. refinery, Lockport, Ill. •c F.o.b. Sugar Creek, Mo. •d F.o.b. refinery, El Segundo. •e F.o.b. Baton Rouge. •f F.o.b. Hartford, Ill. •g F.o.b. refinery, Richmond, Calif. •h F.o.b. Martinez. •i F.o.b. refinery, Baltimore. •j F.o.b. refinery, Inglewood, Calif. •k 50-110 penetr. •l Less than 100 penetr. •m 40-300 penetr. •n F.o.b. refinery, Montreal. Fed. tax included; add 6% for mun. & prov. •o Drums not avail. Shipped in stee lbbl. •p 60/70 penetr. •r In customer's drums. •s Shipped in drums, per drum. •t 150/300 penetr. •u Per 100 gal. •v Per ton. •w Per gal. •x Also tank trucks •y F.o.b. Oakland. •z F.o.b. Edmonds. •A F.o.b. refinery, Cleveland. •B F.o.b. Destrehan, La. •E RC. •F Also RC. •G Also MS •H RC 0-5 incl. •I MC 4. •J MC, RC $0.095. •K MC 3, 4, & 5. •L MS. •M MC 1-5, RC 1-5, $0.0918. •N MC 3. •O Truckload. •P F.o.b. refinery, Atlanta. •Q F.o.b. Eldorado, Ark. •R Delivered within 50 mi. •S Less 2% disc. 10 days, net 30. •T Less 1% disc. 10 days. •U F.o.b. refinery. •V Less 2% disc. 15 days. •W SC 2. •X RS 1. •Y SC 1. •Z Incl. 10% Sales Tax. •aa SC 3, 4, & 5 •bb RS 3 •cc In used drums. •dd less disc of $1 ton. •ee 45 lmp. gal. drums •ff 60-150 penetration

Bid Asked—Low Bidders—Contracts Awarded—

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—LB & CA

▲ **Slattery Contg. Corp.**, 46-36 54 Rd., Maspeth, N. Y., CA **$4,624,321**, Contr. 161, constr. basin ROADWAYS and UTILITIES for Permanent Park use incl. temporary New York World's Fair 1964-1965 constr. Flushing Meadow Park, Queens Boro, FLUSHING, N. Y. Comr. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., New York 1, N. Y. BA 7/6/61. CD 7/10/61, under LB.

▲ **NEW JERSEY**—State Hy. Dpt., 1035 Parkway Ave., Trenton, ROADS,
Franklin Contg. Co., U.S. Rte. 46, Little Falls, N. J., CA **$4,598,772**, grading, paving and bridges 1.815 mi. Rte. 287, Sections 12A and 13A from Rte. 202 to Vreeland Ave., Proj. I-287-3(6)41, Boonton, Morris Co. BA 7/5/61, CA 7/26/61. CD 7/7/61.

BUILDINGS—LB & CA

▲ **White Constr. Co.**, 305 East 45 St., New York 17, N. Y., CA Est. **$4,000,000**, 1,000 boys Monsignor Farrell Memorial HIGH SCHOOL, Amboy Rd., Oakwood Heights, GREAT KILLS, N. Y. Archdiocesan Bldg. Comn., 451 Madison Ave., New York 22, N. Y. BA 6/28/61. CD 6/22/61.

▲ **Diesel Constr. Co.**, 642 Fifth Ave., New York 17, N. Y., CA Est. **$30,000,000**, 32 story, 800,000 sq. ft. OFFICE, 140 Broadway, NEW YORK, N. Y. Erwin S. Wolfson, 529 Fifth Ave., New York 17, N. Y. Skidmore, Owings & Merrill, 425 Park Ave., New York 22, N. Y., archts.

▲ **J. Alexander Stein Co. Inc.**, 103 E. 125 St., New York 35, N. Y. and **Good Luck Constr. Co. Ltd.**, 5300 Yonge St., Toronto, Ont., Can., CA Est. **$4,000,000**, 4 story National Maritime Union of America Bldg. OFFICE, Seventh Ave. between 12 and 13 Sts., NEW YORK, N. Y. National Maritime Union of America, 346 W. 17 St., New York 11, N. Y. A. C. Ledner & Assocs., 501 N. Jefferson Davies Parkway, New Orleans, La., archts. Arthur A. Schiller, 15 Luquer Rd., Port Washington, N. Y. assoc. archt.

The Nicholson Co., Inc., 10 Rockefeller Plaza, New York 20, N. Y., CA **$300,000**, design and construct CEMENT PLANT ADDN., ROCHESTER, N. Y. Rochester Portland Cement Co., 361 Boxart, Rochester, N. Y.

▲ **The Nicholson Co., Inc.**, 10 Rockefeller Plaza, New York 20, N. Y., CA Over **$1,000,000**, design and construct CEMENT DISTRIBUTION PLANT, ROME, N. Y. Mohawk Valley Cement Co., Rome, N. Y.

▲ **Crump, Inc.**, 4031 Bigelow Blvd., Pittsburgh, Pa., CA **$4,159,000**, est $4,000,000, HOSPITAL ADDN., PITTSBURGH, PA. Montefiore Hospital, Hospital, Bd. Trustees, 3459 Fifth Ave., Pittsburgh, Pa. BA 6/22/61. CD 6/27/61 under LB.

▲ **Kirby & McGuire, Inc.**, 2518 Greenmount Ave., Baltimore, Md., CA **$4,000,000**, OCEAN CABLE PLANT NO. 20, BALTIMORE, MD. Western Electric Co., 165 Broadway, New York 38, N. Y.

▲ **Contractors, Inc.**, 711 S. Central Ave., Baltimore, Md., CA **$7,403,000**, CIVIC CENTER, BALTIMORE, MD. City, City Hall, Baltimore, Md. BA 7/26. CD 7/28/61, under LB.

SOUTH

HEAVY CONSTRUCTION—BA

▲† **Fla., Cocoa**—BA 8/29—U. S. Eng., 575 Riverside Ave., Jacksonville, Complex 37, Cape Canaveral Missile Test Annex, Patrick Air Force Base, ENG-08-123-62-1B. Over $10,000,000. CD 7/19/61.

HEAVY CONSTRUCTION—LB & CA

▲ **LOUISIANA**—Ascension-St. James Bridge and Ferry Auth., Hotel Donaldson, 508 Mississippi St., Donaldsonville, Bids opened 7/26, BRIDGE,
Morrison-Knudsen Co., Inc., 150 East 42nd St., New York, N. Y., and **Keller Constr. Corp.**, 7900 Palm St., New Orleans, La., LB **$7,483,000** Base Bid, LB Alt. Bid **$7,423,000** substituting pipe piles, constr. substructure Sunshine Toll Bridge across Mississippi River at Donaldsonville. CD 7/12/61.

BUILDINGS—LB & CA

▲† **A. C. Samford, Inc.**, 630 Slappey Dr., P.O. Box 1229, Albany, Ga., CA **$7,749,200**, 498 units CAPEHART HOUSING, ENG-01-076-61-70, FORT RUCKER, ALA. U. S. Eng., P.O. Box 1169, Mobile, Ala. BA 5/24/61. CD 5/29/61, under LB.

▲† **H. K. Ferguson Co.**, 1783 E. 11th St., Cleveland, O., CA Est. **$6,000,000**, HIGH FLUX ISOTOPE REACTOR (HFIR) OAK, RIDGE, TENN. Atomic Energy Comn., P.O. Box E, Oak Ridge, Tenn. Work underway, Singmaster & Breyer, 420 Lexington Ave., New York, N. Y., engrs.

MIDDLE WEST

BUILDINGS—LB & CA

▲ **Kesk, Inc.**, 136 S. Derbigny St., New Orleans, La., LB **$3,639,770**, (22 bidders), 348 unit HOUSING, YOUNGSTOWN, O. Youngstwon Metropolitan Housing Auth., 976 W. Federal St., Youngstown, O. BA 8/1/61. CD 7/26/61.

▲ **Meredith Drilling Co.**, 5929 Woodson St., Mission, Kan., CA Total est. **$25,600,000**, CAISSONS for foundations and plant and boilers power generating plant, 99,000 kw, South Fork Saline River near Marion, ILLINOIS. Southern Illinois Power Cooperative, Steeleville, Ill. Burns & McDonnell Engineering Co., 4600 E. 63rd St., Trafficway and P.O. Box 173, Kansas City 41, Kan., engr. CD 4/1/60.

▲ **Rust Engineering Co.**, 930 Duquesne Ave., Pittsburgh, Pa., CA Est. **$7,500,000**, INGOT MOLD PLANT, TRENTON, MICH. Vulcan Mold & Iron Co., Mold Ave., Latrobe, Pa.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

▲† **South Dakota**—BA 10/5—U. S. Eng., 6012 U. S. Post Office & Court House, Omaha 2, Neb., Stage No. 2, EARTHWORK, excavation of 10 million cu. yd. shale, chalk and muck, replacement by 7 million cu. yd. filling replace topsoil, bedding, material, spalls and riprap, Big Bend Reservoir, ENG-25-066-62-15. $5,000,000. CD 7/21/61.

▲† **South Dakota**—BA 10/10—U. S. Eng., 215 N. 17th St., Omaha 2, Neb., SPILLWAY STRUCTURE, Big Bend Reservoir, ENG-25-066-62-12. Approx. $6,000,000. Plans deposit $10. CD 7/24/61.

BUILDINGS—BA

▲† **S. D., Rapid City**—BA On Or About 8/31—Base Procurement Office, Ellsworth Air Force Base, constr. ARMED SERVICES HOUSING, consisting 500 family housing units, Ellsworth Air Force Base, ENG-39-601-62-4. Plans deposit $150. CD 4/12/61.

BUILDINGS—SLC

▲ **Tex., Houston**—Cullen Center, Inc., 1st City National Bank Bldg., Phase 1, soon lets contract 12 story, bsmnt., masonry HOTEL, with swimming pool. $6,000,000. Welton Becket & Associates, 802 Lovett Blbd., archts. Lockett, Andrews & Newman, 1010 Waugh Drive, and H. E. Bovay, Jr., 5009 Caroline St., engrs. CD 4/4/61.

HEAVY CONSTRUCTION—LB & CA

▲† **Peter Kiewit Sons Co.**, 1024 Omaha National Bank Bldg., Omaha, Neb., CA **$56,220,274** MINUETMAN MISSILE BASE, Ellsworth Air Force Base, ENG-04-548-61-43, RAPID CITY, S. D. U. S. Eng., Ballistic Missile Constr. Office, 9610 Bellanca Ave., Los Angeles, Calif. BA 7/25. CD 7/27/61, under LB.

BUILDINGS—LB & CA

▲ **Bechtel Corp.**, 200 Bush St., San Francisco, Calif., CA, 66 MEGAWATT ADDN. Hoot Lake Power Station, FERGUS FALLS, MINN. Otter Tail Power Co., Fergus Falls, Minn.

▲ **Carpenter Constr. Co.**, 600 W. Penn, Oklahoma City, Okla., CA Est. **$4,000,000**, 11 story APARTMENT, MOUNTAIN HOME, ARK. Riverside Estates, Inc., c/o Richard Montgomery, 4230 S. 24 W. Ave., Tulsa, Okla.

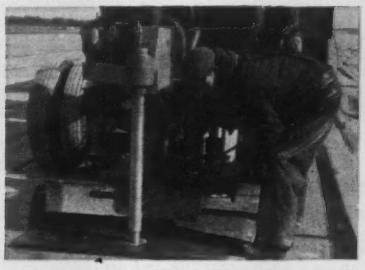
▲ **Westex Industries, Inc.**, E. Seminary Drive, Fort Worth, Tex., Owner Builds, **$6,000,000**, $1,000,000 1st year, (five years to complete), COMMERCIAL, HOUSING, and INDUSTRIAL DEVELOPMENT along E. Seminary Drive, incl. shopping center, warehouses, 300 unit housing proj., FORT WORTH, TEX. Robert P. Wotiz, Jr., 1502 W. Rosedale, Fort Worth, Tex., archt.

▲ **Sabine Valley Lumber Co., Inc.**, 4329 E. Belknap St., Fort Worth, Tex., Owner Builds, **$10,000,000**, $1,000,000 1st year (three years to complete), Rancho North RESIDENTIAL ADDN., 700 one story, brick veneer residences and shopping center, covering 200 acres, site work, streets and utilities, constr. to start in 1962, SAGINAW, TEX. Freese, Nichols & Endress, 407 Danciger Bldg., Fort Worth, Tex., engrs.

▲ **Austin Rankin Corp.**, 3815 Richmond Ave., Houston, Tex., CA 10 million ft. per day NATURAL GAS-BUTANE-PROPANE PLANT, SEADRIFT, TEX. Cities Service Petroleum Co., Bartlesville, Okla.

▲ **Martin K. Eby Constr. Co.**, 1130 S. McComas St., Wichita, Kan., general contract, BANK ADDN., Lincoln St., DENVER, COLO. Denver United States National Bank, Mile High Center, Denver, Colo. Total LB Under **$4,500,000**. BA 7/25/61, CD 6/12/61;
Midwest Plumbing & Heating, Inc., 2450 Blake St., Denver, Colo., LB PLUMBING and HEATING for bank addn. (Denver, Colo.);
Scott Bros. Electric Co., 1413 Court Place, Denver, Colo., LB ELECTRICAL WORK for bank addn. (Denver, Colo.).

TRUCO® DOES IT AGAIN!
80% cost reduction in airport runway lighting by installation of pancake lights



Above: Drilling holes for light units.
Left: Cutting slot raceways for wiring.

Truco "pancake" diamond drill on Truco Model G, gasoline powered, truck-mounted drill rig cut holes for light units 6″ dia. x 1″ deep. Truco Concrete Saw with 14″ Truco diamond blades sawed miles of slots for wiring raceways in both bituminous and portland cement concrete runways. Even greater savings now possible using new Tru-Vac® Vacuum Pad to anchor drill rig in seconds. Write for our new Catalog.

TRUCO

MASONRY DRILLING DIVISION
WHEEL TRUEING TOOL COMPANY
175-3200 W. Davison, Detroit 38, Mich. • 575 Langlois, Windsor, Ont.

▲† **Electronics & Missile Facilities, Inc.**, 2 Lafayette St., New York, N. Y., LB **$3,980,424**, 260 units No. 3 CAPEHART HOUSING, Malmstrom Air Force Base, GREAT FALLS, MONT. Base Procurement Office, Malmstrom Air Force Base, Great Falls, Mont. BA 8/1/61. CD 6/22/61.

FAR WEST

HEAVY CONSTRUCTION—LB & CA

▲† **Baldwin-Lima-Hamilton Corp.**, Philadelphia National Bank Bldg., Phila., Pa., LB **$15,486,900**, thirteen HYDRAULIC TURBINES, installed Lower Monumental and John Day Dams, Inv. 61-46, WASHINGTON. U. S. Eng., City-County Airport, Walla Walla, Wash. BA 7/27/61. CD 7/18/61.

▲ **CALIFORNIA**—State Div. Hys., 120 South Spring St., Los Angeles, ROAD,
Peter Kiewit Sons' Co., 345 Kieways Ave., Arcadia, Calif., CA **$3,659,857**, four-tenths mi. eight lane freeway and ten traffic separation structures, Santa Monica Freeway, Los Angeles Co. BA 7/13. CD 7/18/61, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento, Bids opened 8/2, ROAD,
Stolte, Inc. and Morrison-Knudsen Co., Inc., 8451 San Leandro St., Oakland, Calif., LB **$6,997,406**, (6 bidders), grading, paving and 16 structures, 19 retaining walls and pumphouse to provide 2.9 mi. eight lane freeway on MacArthur Freeway (US Hy. 50) between Park Blvd. and Buell St., Alameda Co. CD 6/21/61.

▲ **CALIFORNIA**—State Div. Hys., 120 South Spring St., Los Angeles, Bids opened 7/27, ROAD,
Ukropina-Polich-Kral-Ukropina, 201 East Las Tunas Dr., San Gabriel, Calif., LB **$4,482,585**, (3 bidders), grading, paving 2.4 mi. six and eight lane freeway, Golden State Freeway between 0.1 mi. west of Lankershim Blvd. and Osborne St., Los Angeles Co. CD 6/28/61.

▲ **City of San Diego**, Rm. 161, Civic Center Bldg., San Diego 1, Calif., cancelled bids to have been opened Aug. 2, INTERCEPTOR SEWER, Contr. No. 1, sewage collection treatment and disposal sys., SAN DIEGO, CALIF. **$5,454,300**. CD 7/5/61.

BUILDINGS—LB & CA

▲ **Larwin Fund**, 8692 Wilshire Bldd., Beverly Hills, Calif., Owner Builds, **$7,000,000**, 400,000 sq. ft. Vallejo Plaza SHOPPING CENTER, 4,000-car parking, VALLEJO, CALIF. Novinkoff Engineers, 3858 W. Santa Barbara, Los Angeles, Calif., engrs. CD 2/19/60.

CANADA

BUILDINGS—BA

▲ **Ont., Sault Ste. Marie**—BA 8/22—General Hospital Bd. Plummer Memorial Hospital, Queen St. E., 2 wing 1,900,000 cu. ft. brick, stone, structural steel HOSPITAL ADDN. $3,750,000. Fabbron & Townend, 251 Lorne St. S., Sudbury, archts. Routhwaite & Fairfield 93 Yorkville Ave., Toronto, archts. CD 2/1/60.

HEAVY CONSTRUCTION—LB & CA

▲ **C. A. Pitts General Contractor Ltd.**, 30 Commercial Rd., Toronto, Ont., LB **$4,433,192**, rein.-con., structural steel ELEVATED STRUCTURE from Rees St. to York St., F. G. Gardiner Expressway (R-18-61), TORONTO, ONT. Municipality of Metropolitan Toronto, 67 Adelaide St., W., Toronto, Ont. BA 7/25/61. CD 7/18/61.
The Dufferin Constr. Co., Ltd., 2700 Dufferin St., Toronto, Ont., LB **$391,391**, BRIDGE over C.N.R. tracks, Markham Rd. (R 19-61) (Toronto, Ont.)

BUILDINGS—LB & CA

▲ **Canadian Bechtel Ltd.**, 25 King St. W., Toronto, Ont., CA Total est. **$20,000,000**, GAS PROCESSING and SULPHUR PLANT, to produce approx. 1,000,000 cu. ft. processed gas daily for delivery to Alberta and Southern Gas Co. Ltd. for U.S. export, PINCHER CREEK, ALTA. Shell Oil Co. of Canada Ltd., 505 University Ave., Toronto, Ont. CD 11/11/60.

▲ **Belmar Realty Ltd.**, 347 Bay St., Toronto, Ont., Owner Builds, **$28,000,000**, nine 12 story, eight 8 story, four 14 story, rein.-con. frames, brick facing APARTMENTS, Jane St. near Wilson Ave., TORONTO, ONT. Uno Prii, 120 Eglinton Ave. E., Toronto, Ont., archts.

AMERICANS ABROAD

HEAVY CONSTRUCTION—LB & CA

▲ **Grove, Shepherd, Wilson & Kruge, Inc.**, 400 Madison Ave., New York, N. Y., U.S.A., CA INTERNATIONAL AIRPORT at Bole east side of Addis Ababa, ETHIOPIA. Minister P. Wks. & Communications, Imperial Govt. Ethiopia and Ethiopian Airlines, Addis Ababa, ETHIOPIA. CD 1/26/61.

BUILDINGS—LB & CA

▲ **Lummus Co.**, 385 Madison Ave., New York, N. Y., U. S. A. CA POLYBUTADIENE RUBBER PLANT, RECIFE, BRAZIL. Govt. of Brazil, Rio De Janiero, Brazil. Firestone Tire & Rubber Co. will operate.

▲ **Camp Ltd. (Joint Venture of Harley & Plant Ltd. and E. G. M. Cape International Ltd.)**, 214 Spanish Town Rd., Kingston, Jamaica, BWI and c/o IMEC of Florida, Inc., 1705 NW 7 St., Miami, Fla., U.S.A., CA Approx. **$5,000,000**, HOTEL, SWIMMING POOL, CONVENTION HALL, Knutsford Rd., Kingston, JAMAICA, B.W.I. New Kingston Hotel Ltd., Box 223, Kingston, Jamaica, BRITISH WEST INDIES. Charles Giller & Assocs., 4100 N. Miami Ave., Miami, Fla., U.S.A., archts.-engrs. Saul Neufeld, 100 NE 1265 St. N., Miami, Fla., U.S.A., engr. Sheraton Corp., 470 Atlantic Ave., Boston, Mass., U.S.A., lessee. BA 7/21. CD 6/29/61.

▲ **Allis-Chalmers Mfg. Co., 1126 S. 70, Milwaukee, Wis.**, U. S. A. CA URANIUM-THORIUM FUEL REPROCESSING PLANT, South Italy, ITALY. Comitato Nazionale per L'Energia Nucleare; Govt. of Italy, Rome, Italy. Blaw-Knox Co., 300 6 Ave., Pittsburgh, Pa., U. S. A., engrs.

LATIN AMERICA

HEAVY CONSTRUCTION—BA

▲ **ARGENTINA**—BA 8/25—Direc. Vialidad Prov. Buenos Aires, Calle 7, 1175 La Plata, Buenos Aires, ROAD. 127 klm. basic work and paving access roads to Salliquelo, Ing. Thompson and Quenuma. Prov. R. 85, Guamini-Natl. R. 5, Prov. Buenos Aires, Guamini. $5,000,000.

HEAVY CONSTRUCTION—LB & CA

▲ **ARGENTINA**—Direcc. Nacional Vialidad, Maipu 3, Buenos Aires, ROAD.
Fernado Meijide Perales Aguiar, Polledo, Cisflatina, Venezuela 736, Buenos Aires, Argentina, CA **$32,316,000**, est. $26,250,000, 720 kilm's. basic works bit. paving and high level bridge (1) R. 188 Lincoln-Rio Salado (II), R. 35 Realico-Eduardo Castex (III), R. 35 N. Bruzzone-Holmberg Prov. Buenos Aires, S. Luis, La Pampa, Cordoba, Lincoln, Realico, Holmberg. BA 7/14. CA 7/14.

▲ **ARGENTINA**—Direccion De Vialidad Prov. Buenos Aires, Calle 7, 1175 La Plata, Buenos Aires, ROAD.
Empressa Argentina Construcciones Publicas of Avenida, Belgrano 687, Buenos Aires, Argentina, CA **$4,072,289**, paving provincial Hy. No. 66 and Access Rtes. to Tiburcio Ascension, General Arenales and Arribenos.

▲ **Perini Corp.**, 73 Montwait Ave., Framingham, Mass., CA Approx. **$14,500,000**, general contract earthen CALIMA DAM, COLOMBIA. Corporacion Autonoma Regional del Cauca (C.V.C.) Edificio Zaccour, Cali, Colombia. Tippetts-Abbett-McCarthy-Stratton, 375 Park Ave., New York 22, N. Y., U. S. A., engrs.

FOREIGN

BUILDINGS—BA

▲ **Ethiopia**—BA October 1961—Ministry P. Wks., Imperial Ethiopian Govt., Addis Ababa, Ethiopia, 500-bed Duke of Harar MEMORIAL HOSPITAL. $5,000,000-$6,000,000.

For additional reports see CONSTRUCTION DAILY REPORTS SECTION

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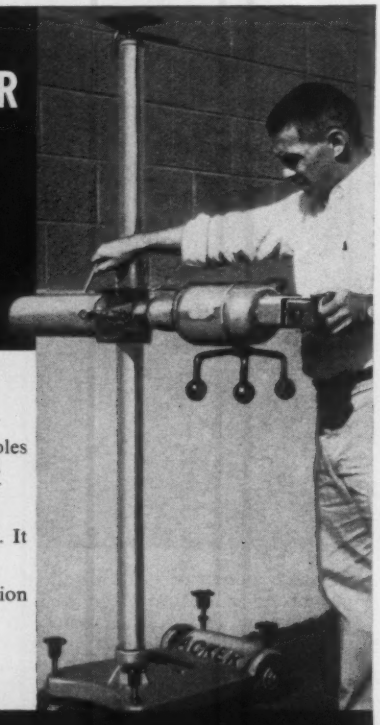

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PROPOSED PROJECTS

WATER SUPPLY

▲ **Texas**—Greenbelt Municipal & Industrial Water Authority, Wellington, Greenbelt DAM and RESERVOIR, Salt Fork of Red River, to impound 156,000 acre ft. water to serve 6 cities in area Wellington. **$9,000,000**. Freese, Nichols & Endress, 407 Danciger Bldg., Fort Worth, consult. engrs.

AIRPORTS

▲ **Ga., Atlanta**—City, City Hall, JET HANGAR and MAINTENANCE FACILITY. **$4,000,000**. Eastern Airlines, Atlanta Airport Terminal, lessee.

UNCLASSIFIED

▲ **Tex., Houston**—Comrs. Harris County, Court House, plans by Lloyd & Morgan, 4605 Montrose St., and Wilson, Morris, Morris, Crain & Anderson, 333 Graustark St., all weather STADIUM, S. Main and Alameda Sts. **$15,000,000**. Lockwood, Andrews & Newman, 1010 Waugh Drive, J. G. Turney, 2502 MacGregor St., Walter P. Moore, 2 Pinedale St., and Robert Cummins Co., Bankers Mortgage Bldg., Houston, Tex., Praeger, Kavanaugh & Waterbury, 126 E. 38th St., New York 16, N. Y., consult. engrs.-archts. CD 8/25/58.

PUBLIC BUILDINGS

▲ **Calif., Riverside**—University of California, Bd. Regents, Admin. Bldg., plans by George Vernon Russell & Assoc., 410 N. Rosenell Terr., Los Angeles, two 4 story, 177,000 sq. ft. RESIDENCE HALL, at University of California, at Riverside Campus. **$4,100,000**.

▲† **Md., Bethesda**—General Services Admin., 19 and F Sts. N.W., Wash., D. C., plans by Smith, Hinchman & Grylls Assocs., Inc., 3107 W. Grand Blvd., Detroit, Mich., National CANCER INSTITUTE BLDG., **$12,000,000** (no appropriation); BUILDING for National Institutes of Mental Health and National Institute of Neurological Diseases and Blindness, both at National Institutes of Health, for Department of Health Edu-

cation and Welfare, $12,000,000 (no appropriation). CD 5/16/61

▲ **N. Y., New York**—New York City Housing Auth., 299 Broadway, Zone 7, Proj. NY 5-63, one 21 story, (center of block) and one 19 story (northwest corner East 27th St. and Second Ave.), total 275 units. APARTMENTS. $4,920,000. CD 4/28/61.

▲ **Ont., Ottawa**—Ontario Dpt. P. Wks., East Block, Parliament Bldgs., Toronto, TRADES SCHOOL, Woodroofs Ave., for Ontario Dpt. Educ. $3,000,000.

COMMERCIAL BUILDINGS

▲ **Calif., Beverly Hills**—Robert Felixson, 404 N. Roxbury Drive, plans by Sidney Eisenshtat, 1145 S. Beverly Drive, 8 story, 135,000 sq. ft. OFFICE, Santa Monica Blvd., Linden Drive, incl. 450 car GARAGE, $5,000,000.

▲ **Calif., Los Angeles**—Theodore H. Bentley, Ray A. Watt, Bill S. Hunter, c/o Paul R. Williams & Les Scherer, archts., 3757 Wilshire Blvd., five 14 story Hollwood Highlands, APARTMENT HOUSE PROJECT, near Hollywood Bowl, $16,000,000.

▲ **Calif., Oakland**—California-Nevada Methodist Homes Assn., c/o John Graham Co., archt., 1426-5th St., Seattle, Wash., two unit, 12 story, APARTMENT, INFIRMARY and basement garage, $6,000,000.

▲ **Calif., West Covina**—Broadway Dpt. Stores, 401 S. Broadway, Los Angeles, plans by Charles Luckman & Associates, 9220 Sunset Blvd., Los Angeles, 4 story, Type 1, DEPT. STORE, off San Bernardino Freeway. $8,000,000. Bids October 1961.

▲ **Fla., Hollywood**—J. A. Gantor & Assocs., Inc., 1451 N. Bayshore Dr., Miami, plans by Frank Mudano, P.O. Box 1307, Clearwater, SHOPPING CENTER. $5,000,000. Anson & Kerr, 18 NE 4th St., Fort Lauderdale, assocs. archts.

▲ **Mass., Boston**—Owner, c/o Minot, Deblois & Maddison, Real Estate Mgrs., 294 Washington St., OFFICE, High and Oliver Sts. $20,000,000. Bids early 1962.

▲ **Mich., Detroit**—Sam Minskoff & Sons, 521 Fifth Ave., New York 17, N. Y., plans by Harley, Ellington, Cowin & Stirton, Inc., 153 East Elizabeth St., Detroit 1, Mich. and Emery Roth & Sons, 400 Park Ave., New York 22, N. Y., consult. archts., 26 story, pre-cast quartz aggreg. panel facade Detroit Bank and Trust Co. OFFICE, Fort St. and Washington Blvd. $16,000,000. Constr. Fall 1961. CD 2/7/57.

▲ **N. Y., Glen Oaks and New Hyde Park**—Home & Hospital of Daughters of Israel, c/o Federation of Jewish Philanthropies, 130 East 59th St., New York, Zone 22, 300-bed HOME FOR AGED in this vicinity. $4,500,000.

▲ **N. Y., New York**—Beth Abraham Home, 612 Allerton Ave., Zone 67, 9 story HOSPITAL REPLACEMENT and CONVERSION. $4,000,000.

▲ **N. Y., New York**—Beth Israel Hospital, Stuyvesant Sq. East and East 17th St., Zone 3, 300-bed HOSPITAL MODERNIZATION and RENOVATION. $5,198,000.

▲ **N. Y., New York**—Madison Square Garden Center, Inc., c/o Graham-Paige Corp., 410 Park Ave., New York, Zone 22, plans by Chas. Luckman Assocs., 680 Fifth Ave., New York, Zone 19, RECREATION ARENA, OFFICE BLDGS., HOTEL, CONVENTION HALL, site of Pennsylvania Station, 7 to 8 Ave., 31-33 Sts. $50,000,000. CD 11/9/60.

▲ **N. Y., New York**—Montefiore Hospital, East 210 St. and Bainbridge Ave., Zone 67, OUT-PATIENT BLDG. RESEARCH INSTITUTE, renovation of East Bldg., HOSPITAL ALTERATIONS. $5,080,000.

▲ **N. Y., New York**—Mount Sinai Hospital, 5th Ave. and 100 St., Zone 29, PSYCHIATRIC INSTITUTE and CLINIC SERVICES BLDG., renovation of semi-private pavilion, out-patient and ambulatory care bldg., expansion of surgical suites. $17,000,000.

▲ **N. Y., New York**—Resnich Corp., 40 Vanderbilt Ave., Zone 17, plans by Horace Ginsbern & Assocs., 205 East 42nd St., Zone 17, 16 story, 82 x 124 ft. COOPERATIVE APARTMENT, 1115-1121 Madison Ave. and 42 East 84th St. $4,500,000. Batlin & Oxman, 230 West 41st St., Zone 36, mech. engrs. Greenhut & Taffel, 114 East 32nd St., Zone 16, struc. engrs. Const. in Fall. CD 1/24/61.

▲ **Va., Richmond**—T. & T. Co., 2106 North Hamilton, 300 RESIDENCES, Lake Crystal Farms, Rte. 360, $7,000,000; 300 RESIDENCES, Quail Oaks. $4,500,000.

AMERICANS ABROAD

▲ **New Zealand**—Bechtel Corp., International Div., 3770-P.C. consult. engrs., 220 Bush St., San Francisco 4, Calif., U.S.A. are pre-qualifying bidders for 5.5 mi. 30 ft. diam. Horseshoe shaped, concrete lined TAILRACE TUNNEL Manapouri Hydroelectric Scheme, southern New Zealand for Comalco Power Ltd. Bidders must pre-qualify before August 1. Bids will be asked in September.

▲ **Swenden**, Stenungsund-Mo och Domsjo Aktiebolag, Ornskoldsvik, Sweden, ETHYLENE OXIDE PLANT and ETHYLENE GLYCOL PLANT. Scientific Design Co., Inc., 2 Park Ave., New York 16, N. Y., U. S. A., consult. engr.

FOREIGN

▲ **Italy**, Colleferro-Bombrini Parodi-Delfino S.P.A. Rome, MALEIC ANHYDRIDE PLANT. Scientific Design Co. Inc., 2 Park Ave., New York 16, N. Y., U. S. A., consult. engr.

For additional reports see CONSTRUCTION DAILY NEWSLETTER

(Proposal Advertisements see pp. 82 to 85)

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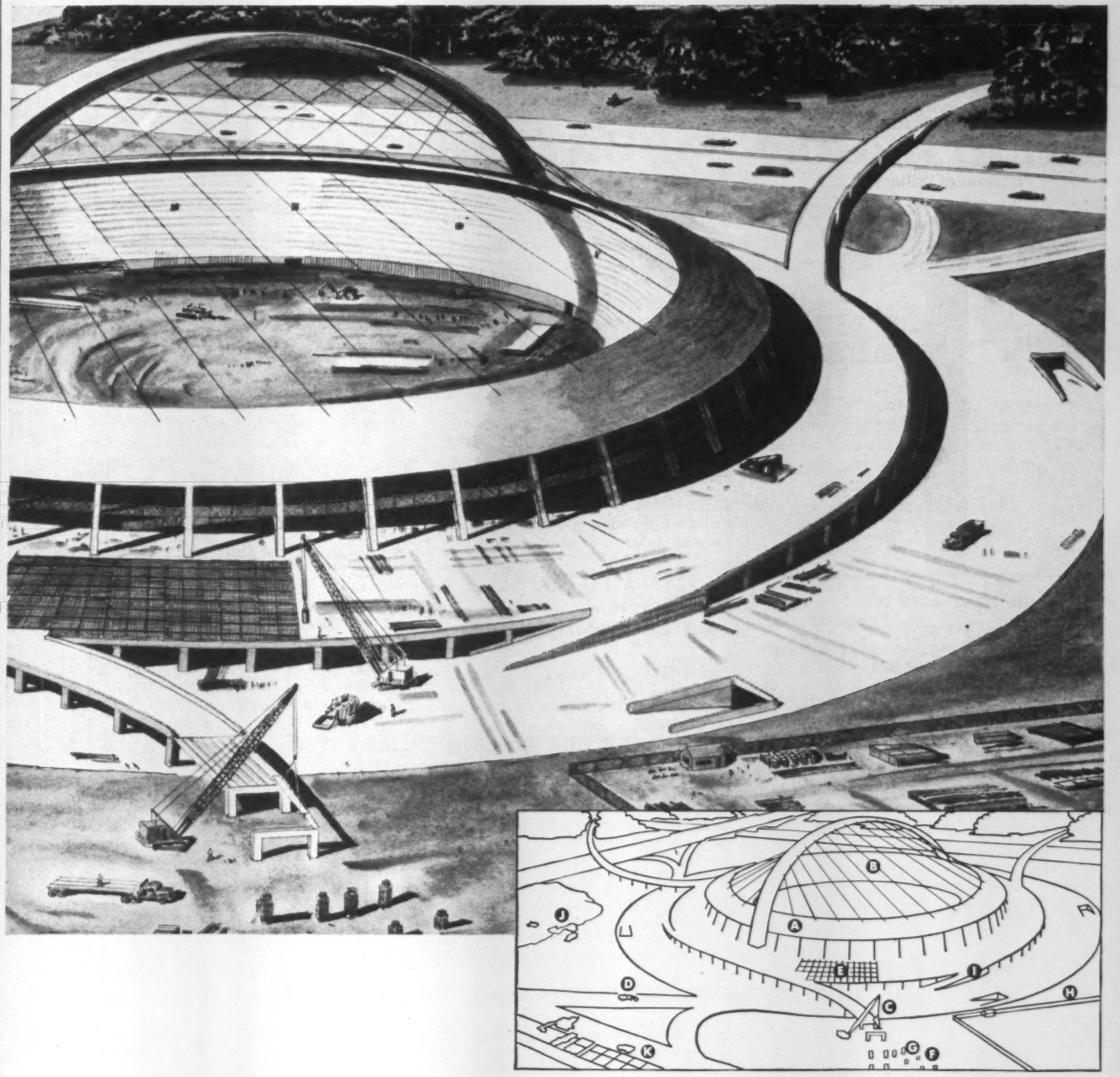
Tomorrow's sports arenas, many now on the drawing boards, will differ vastly from anything in existence today. Using new construction techniques and new construction products, contractors will erect a girderless stadium with an unobstructed view from any section — a stadium with a retractable roof that allows contests to be played in any kind of weather.

CF&I — a nationwide steel company — provides many different steel products for all types of construction, including sports stadiums like the one shown above.

CF&I Prestressed Concrete Strand and Wire **(A)** give the necessary tensile strength to precast concrete beams used in the grandstands of the stadium. These lightweight beams are also widely used in the underground parking area and the ramps leading to the stadium.

CF&I-Wickwire Wire Rope **(B)** could be used to support the transparent plastic roof which folds like an accordian at the arch. For more standard construction uses, CF&I's premium wire rope, Double Gray®-X, gives extra-long life because its wires are protected by a molecular shield of molybdenum disulphide. And *CF&I-Wickwire Wire Rope Slings* **(C)** are selected for safe, dependable hoisting.

CF&I Grader Blades and Cutting Edges **(D)** change hard, rocky ground into smooth roadbeds. *CF&I-Welded Wire Fabric* **(E)** provides steel reinforcement for concrete in main highways, access roads, parking areas and tilt-up constructions, giving them longer life and smoother surfaces. *CF&I Rebars* **(F)** strengthen the concrete columns which support the ramps leading to one of the



three-tier parking areas. And *CF&I Cal-Tie Wire* (**G**) in convenient belt-borne reels, permits safe, fast, economical tying of the rebars.

For maximum security of material and equipment stored outdoors, the contractors choose an easy-to-install *Realock Chain Link Fence* (**H**). It is widely used around parking fields and to control the stream of traffic from the parking areas to the stadium. In addition, Realock Fence is used to separate grandstand sections and is ideal for crowd control along overhead ramps and walkways.

Thousands of pounds of *CF&I Nails* (**I**) are used for wooden scaffolding and concrete forms, while much of the gravel and aggregate is sized on *CF&I Industrial Screens* (**J**). And *CF&I-Wickwire Automotive Springs* (**K**) are extensively used in trucks and service vehicles.

More and more contractors now realize that a domestic steel company—like CF&I—is best equipped to supply them with dependable steel products and expert on-the-job technical assistance. For complete details, contact a nearby CF&I office or write for Catalog G-104 "CF&I Steel Products for the Construction Industry."

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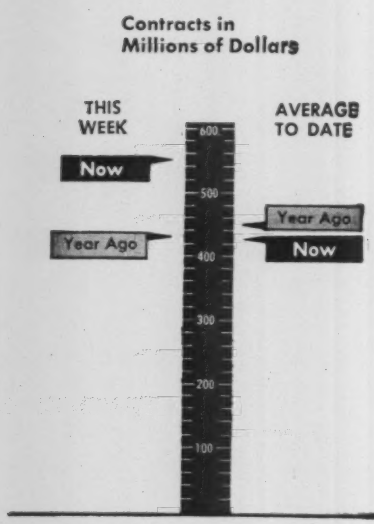
Construction Scoreboard

This Week...



AMOUNT OF CONTRACTS LET

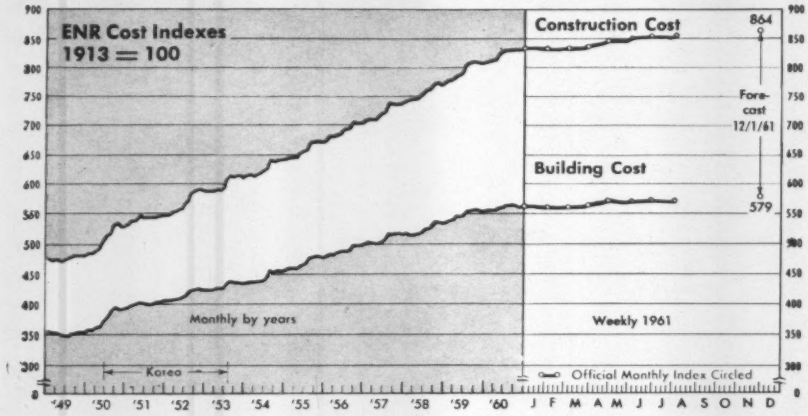
Contracts Awarded In 50 States By Type	This Week millions	Cum. 32 wks 1961	Chge '60-'61 %
All Heavy Construction	$557.3	$13,828.3	− 2
By Ownership			
PRIVATE	240.0	6,649.1	−11
PUBLIC	317.3	7,179.2	+ 8
State & Municipal	230.9	5,446.2	+ 7
Federal	86.4	1,733.0	+11
By Type of Work			
PUBLIC			
Waterworks	6.9	244.0	−19
Sewerage	17.7	449.7	+20
Bridges*	22.5	418.3	−13
Highways	98.5	2,374.2	+15
Earthwork, Dams & Waterways	6.6	539.9	+ 8
Buildings:			
Excl. Housing	62.8	1,696.1	+13
Housing	22.8	545.2	+31
Unclassified	79.5	912.2	−12
PRIVATE			
Buildings:			
Mass Housing	95.9	2,981.2	−19
Commercial	87.6	1,660.5	+ 9
Industrial	47.3	1,734.9	+ 4
Unclassified	9.2	272.1	−52

* Includes Private bridges

NOTE: Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

NEW CONSTRUCTION CAPITAL

	Week of Aug. 3 millions	Cum. 31 wks 1961	Chge '60-'61 %
Corporate Securities	$12.2	$2,128.0	+15
State and Municipal:			
All Except Housing	117.1	4,108.2	− 5
Housing	0	92.9	−49
Federal Loans	0	183.7	+69
Federal Aid	0	2,990.6	+10
Total Nonfederal	$129.3	$9,503.4	+ 4
Federal Appropriations:			
Projects in U.S.	$202.2	$268.6	−80
Outside U.S.	0	2.3	−99
Total New Capital	$331.5	$9,774.3	− 8


ENR Cost Indexes
1913 = 100
Construction Cost
864
Forecast 12/1/61
Building Cost
579
Monthly by years
Weekly 1961
Korea
Official Monthly Index Circled
'49 '50 '51 '52 '53 '54 '55 '56 '57 '58 '59 '60 J F M A M J J A S O N D

ENR Indexes (1913 = 100), 20-cities' average	Week of Aug. 3 1961	% Change from June 29 1961	% Change from July 28 1960
Construction Cost	854.09*	+0.05	+2.4
Building Cost	570.86*	−0.1	+1.5

*Official Monthly Index for August, 1961

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
To convert above indexes to 1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.

This Month . . .

WAGE RATES, 20-cities' average	Aug. 1961	% Change from July 1961	% Change from Aug. 1960
Common	$2.860	+0.3	+4.6
Skilled (average 3 trades)	4.223	+0.2	+3.6
Bricklayers	4.428	+0.2	+2.9
Structural Ironworkers	4.271	+0.09	+4.8
Carpenters	3.971	+0.4	+4.3
Equipment operators (average three types)	3.862	+0.4	+4.5
MATERIAL PRICES, 20-cities' average			
Structural Steel (average 3 mills), per cwt.	5.50	0	0
Lumber, 2x4 Fir, per M fbm	117.32	−0.7	−1.0
Lumber, 2x4 Pine, per M fbm	108.27	−1.2	−1.0
Cement, bulk, per bbl	4.03	−0.2	+0.5
Sand, per ton	2.355	+0.6	−0.3
Ready-mixed concrete, per cu yd	14.21	−0.2	−0.7
Gypsum sheathing, ½″x2′x8′, per Msf*	61.78	−0.7	−1.4
Fiber board sheathing, ½″ sq. ed., per Msf*	70.56	+0.07	−2.0
Mineral wool insulation, 3′ batts, per Msf*	66.92	−0.8	−1.7
Crushed stone, 1½″, per ton, CL	2.711	0	+3.7
Concrete blocks, sand/gravel, 8″x8″x16″, each*	0.2278	+0.7	−0.3

Latest Month . . .

	July 1961	June 1961	July 1960
Brick, common per M	41.28	+0.1	+1.0
Lime, hydrated finishing, per ton, CL	39.68	−0.6	+0.9
Structural clay tile, 3x12x12″, per M, 2,000 up*	193.35	+0.1	+2.7
Vitrified clay sewer pipe, std 12″, per ft	1.450	−0.1	+1.0
Concrete sewer pipe, 12″, per ft	1.421	+1.8	+0.1

* Delivered, trucklots

ENR INDEX REVIEW

	Construction Cost		Building Cost		Volume	
1960	1913 = 100	1949 = 100	1913 = 100	1949 = 100	1913 = 100	1949 = 100
July	829.33	173.85	562.63	159.93	682	197
Aug	830.18	174.03	562.17	159.80	631	182
Sept	830.92	174.19	562.79	159.98	603	174
Oct	829.58	173.90	561.45	159.60	591	171
Nov	830.09	174.01	561.11	159.50	609	176
Dec	830.61	174.12	561.50	159.61	503	145
1960 Average	**823.55**	**172.64**	**559.43**	**159.02**	**597**	**172**
1961						
Jan	834.32	174.90	562.91	160.01	557	161
Feb	834.27	174.89	562.93	160.02	464	134
Mar	834.16	174.87	562.89	160.01	519	150
Apr	837.58*	175.59*	565.19*	160.66*	598*	173*
May	847.32*	177.62*	568.99*	161.74*	609*	176*
June	850.38*	178.28*	570.17*	162.07*	634*	183*
July	853.64*	178.95*	571.66*	162.50*	609*	176*
Aug	854.09*	179.05*	570.86*	162.27*	...	...

*Subject to adjustment due to retroactive wage increases.

Public Works Nudges Construction

Public construction volume hit the best July pace since 1958, but weakness in private work dropped total heavy construction contracts of $1.9 billion 2% below June's weekly rate. The total, however, is only 6% below a year ago, compared to 17% at the end of June.

Volume for the first seven months of $12.8 billion stands only 2% below last year's record.

Public works contracts sparked the January-July market, rising 8% to $6.6 billion. Only 1958 scored a larger volume. In July, $1.2 billion worth of public works went to contract, 14% above the June pace and 26% above one year ago.

Roads, bridges and public housing helped boost state and municipal construction in July to $842 million, topping the June rate by 11% and one year ago by 15%. For the seven-month period, state and municipal agencies awarded almost $5 billion worth of contracts, 7% more than in 1960.

Military construction, Capehart housing and reclamation projects awarded in July pushed federal construction 22% ahead of June to $323 million. This is 67% above a year ago. Seven-month volume of $1.6 billion is 9% above last year's same period. At the end of six months, federal construction volume barely nosed out the 1960 first half.

In contrast to the brisk pace of public work, private activity stumbled in a mid-summer slump. July's volume of $718 million was 20% below June and 34% below a year ago.

For the first seven months, private volume of $6.2 billion lags 11% behind 1960. The total, however, is the fourth best on record, surpassed only by 1960, 1959 and 1956.

Highway contracts of $351 million topped all types of construction in July, with California outdistancing the other states with over $44 million worth of contracts awarded. Ohio ranked second with $36.6 million. Total U. S. volume for the seven-month period registers $2.2 billion, up 14% above a year ago.

Mass housing contracts totaled $350 million in July, with volume continuing its month-to-month sag. The 17% decline in private housing to date put a crimp in the over-all private market this year. For the month, Ohio led with $57.8 million in new housing projects, followed by California with $51.6 million.

Industrial building weakened in recent months, July registering the smallest monthly total since late 1958. The sluggishness in industrial building cuts the year-to-date gain to only 4% above 1960. At the end of June, the first-half gain was 18%.

Construction Costs: Excelsior!

Wage boosts for common labor push construction costs to a record high for the fifth consecutive month. ENR's 20-Cities index of basic construction costs moves up to 854.09, a 0.05% gain over July and 2.9% over August 1960. The index is based on average costs of common labor and basic construction materials in 1913 as 100.

The wage increases responsible for the increase in the over-all Construction Cost Index came under new contracts in Boston and Dallas. They ran 10-15 cents an hour.

ENR's 20-Cities Building Cost Index, which measures skilled labor and materials costs against a 1913 base, moved slightly lower for August. At 570.86, it is 0.1% under July, but 1.5% above last August. This index weighs wage rates much less heavily than the Construction Cost Index, so lower lumber prices this month offset wage increases. Boosts of 15 cents hourly went to Denver carpenters and Seattle bricklayers, 10 cents to Atlanta carpenters, 8 cents to Birmingham structural ironworkers and 5 cents to Dallas carpenters. The last was a deferred pay raise; the others, new contract boosts.

Engineering Construction Contracts for July

	July, 1961								Seven Months			
	New England	Middle Atlantic	South	Mid-West	Mississippi to Rockies	Far West	Total U. S.	% Change '60 to '61	U. S. Cumulative 1961	U. S. Cumulative 1960	% Change '60 to '61	Canada July 1961
Public Works, Total	**39,270**	**272,163**	**167,576**	**162,630**	**282,240**	**241,539**	**1,165,418**	**+26**	**6,615,003**	**6,150,533**	**+ 8**	**64 020**
Waterworks	2,136	2,048	3,747	2,960	6,301	13,595	**30,787**	−40	**222,900**	287,901	−23	2,261
Sewerage	2,066	8,317	8,345	11,009	6,531	13,189	**49,457**	−24	**419,546**	355,777	+18	3,105
Bridges	1,446	43,487	7,390	8,664	9,336	22,940	**93,263**	+76	**381,933**	453,415	−16	7,210
Earthwork, waterways	1,197	5,276	17,115	4,596	28,609	22,148	**78,941**	+61	**526,821**	477,729	+10	6,621
Streets and roads	6,397	57,675	54,642	70,926	88,134	72,946	**350,720**	+12	**2,184,709**	1,918,987	+14	14,994
Buildings: Residential	6,826	27,545	10,334	30,910	12,238	14,278	**102,131**	+83	**507,272**	357,977	+42	8,442
Other	14,296	109,294	46,742	24,933	37,909	42,765	**275,939**	+26	**1,570,769**	1,409,029	+11	9,581
Unclassified	4,906	18,521	19,261	8,632	93,182	39,678	**184,180**	+55	**801,053**	889,718	−10	11,806
State & Municipal	32,448	228,505	122,457	139,320	146,798	172,647	**842,175**	+15	**4,994,385**	4,664,966	+ 7	47,936
Federal	6,822	43,658	45,119	23,310	135,442	68,892	**323,243**	+67	**1,620,618**	1,485,567	+ 9	16,084
Private Total	**49,742**	**121,770**	**136,879**	**143,934**	**147,082**	**118,205**	**717,612**	**−34**	**6,197,883**	**6,966,527**	**−11**	**72,773**
Bridges	150	.....	250	.....	.....	.....	**400**	.....	**490**	1,499	−67	.....
Buildings: Industrial	6,235	3,853	44,335	22,970	27,538	15,560	**120,491**	−59	**1,642,849**	1,586,316	+ 4	29,288
Mass housing	24,037	62,547	38,853	86,994	65,556	71,841	**349,828**	−22	**2,790,519**	3,370,137	−17	26,089
Commercial	19,041	53,880	45,616	31,976	36,013	29,576	**216,102**	−25	**1,506,501**	1,453,008	+ 4	12,971
Unclassified	279	1,490	7,825	1,994	17,975	1,228	**30,791**	−38	**257,524**	555,567	−54	4,425
Total, July 1961—4 wks.	**89,012**	**393,933**	**304,455**	**306,564**	**429,322**	**359,744**	**1,883,030**	**− 6**	.....	.....	....	**136,793**
Total, June 1961—5 wks.	107,377	445,169	415,071	409,020	524,787	490,089	**2,391,513**	....	.....	.....	....	193,206
Total, July 1960—4 wks.	131,116	405,971	400,986	252,591	463,113	351,310	**2,005,087**	....	.....	.....	....	137,428
Seven mos. 1961 (30 wks)	**610,586**	**2,908,676**	**2,160,115**	**1,981,149**	**2,890,108**	**2,262,252**	.....	....	**12,812,886**	.....	**− 2**	**918,006**
Seven mos. 1960 (30 wks)	800,101	3,140,735	1,948,977	2,064,810	2,998,114	2,164,323	.....	....	.....	13,117,060	....	1,167,950
% Change '60 to '61	−24	−7	+11	−4	−4	+5	.....	....	.....	.....	....	−21

ENGINEERING NEWS-RECORD *reports U. S. (50 states) construction projects of the following minimum costs—Waterworks, excavation, drainage and irrigation, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.*

Cleveland contractor Bill Hunkin warns employers to . . .

Pull Together or Run the Risk of

"Unless the major employers in the construction industry, both contractors and subs, can get together to stabilize wage rates, the only alternative to pricing ourselves completely out of the market is federal wage controls."

This warning comes from William J. Hunkin II, president of Hunkin-Conkey Construction Co., Cleveland, Ohio.

"I very definitely dislike the idea of Big Government. And I don't like government intervention or government control in peace time," says Mr. Hunkin, who calls himself "the staunchest, most vocal Republican you'll ever find."

But, he explains, "We're engaged in a battle of competition for world markets. Part of the reason our manufacturers are losing the battle is that modern, efficient plant space costs too much to build.

"Up to now, the construction industry has not been able to police itself to control wage rates. Labor leaders have shown little inclination to do so. The point has nearly been reached where contractors can no longer afford to absorb wage increases. So, it looks like it's got to be federal controls."

• **Speaks with experience**—Bill Hunkin speaks not from an ivory tower but as head of one of the nation's largest privately owned general contracting firms. And he speaks as a veteran of many area-wide bargaining sessions with the building trades unions in Cleveland. His firm stands among the upper half of the 88 companies that made ENR's top-contractor list for 1960 (ENR, July 20, p. 24).

Having been chairman of the negotiating committee of the Cleveland Building Trades Employers' Association (BTEA) since 1955, Bill Hunkin is an accomplished negotiator—half Thespian, colorful yet boyishly uncomplicated, and half gladiator, which suits his natural inclination to take a decisive stand and fight hard for it.

The fact that Mr. Hunkin, unlike some employers, has the courage to speak with candor on critical labor issues and to rally others to his cause has helped promote in the Cleveland construction industry the kind of concerted self-control he advocates.

When local labor contracts came up for renegotiation three years ago, for example, Mr. Hunkin spearheaded a contractor effort to get union acceptance of a nine-point program to eliminate wasteful work practices, increase productivity and reduce building costs. Basically, it was an effort, hailed by the local press, to keep soaring construction costs from pricing contractors out of business. How? By getting workers to help compensate for periodic wage increases by giving "a full day's work for a full day's pay."

When one of the unions broke away from the group bargaining and struck, the contractors retaliated with a shutdown of work. Pulling no punches, Mr. Hunkin said: "They thought they could whipsaw us, but a strike against one is a strike against all. This is fundamental to group bargaining." The longest stoppage in the local industry's history followed. In the end, Mr. Hunkin's negotiating team not only won union assurance of cooperation in the cost-cutting program, but it also got Cleveland's first three-year construction labor contracts.

This year, with local construction activity again in the doldrums, the cost-conscious Mr. Hunkin renewed his plea for realistic and strike-free bargaining to promote industry stability and prosperity.

When the unions presented their demands, Bill Hunkin stamped from the room with: "We expect them to come in with a first demand that is high, but this is ridiculous." What the unions had asked for was a wage-fringe package that would have cost up to $1.04½ an hour at a time when over 50% of the workers were unemployed.

The outcome, achieved without a strike, was agreement on three-year contracts with annual increases of 15 cents. The stabilization that the long-term contracts assured had been a prime employer objective.

"Costs are getting out of hand."

"Wages must be stabilized."

Federal Wage Controls

• **Suggests a key to stabilization**—These two incidents give some indication of Mr. Hunkin's major concerns as a negotiator: intelligent control over labor costs, stabilization of wages, and effective, area-wide, group bargaining on a broad and united front. Greater cooperation on an area-wide basis between generals and subs of all types, he thinks, provides the best control over labor costs and the strongest bulwark against suicidal collective bargaining results.

In arguing this point, Mr. Hunkin speaks with the benefit of his experience in Cleveland, where the seeds of area-wide, group bargaining were sown in World War II. At that time, representatives of both employers and unions went together to Washington to petition the War Labor Board for higher wages so that skilled labor could be attracted to the area. The plea was granted—and from that time on the idea of jointly working out a problem has grown.

For many years, however, unified demands and offers were something less than enthusiastically accepted in Cleveland, even among employers. Bill Hunkin has had much to do with making it an effective practice. He decided if it were going to work at all, area employers would have to present a united front. That took time to develop—as did the grooming of a man with plenty of vigor and determination.

"I didn't have the time to spend on it. But I felt I couldn't afford not to spend the time," says Mr. Hunkin.

"This still isn't the tightest organization in the world, but it seems to me a lot better than anyone else has come up with," he says of the BTEA, an association of contractor's associations representing about 150 member companies in the four counties around Cleveland. Only one-third of the membership is general contractors; major subcontractors and specialty trades employers also are members.

• **Sees hope in Cleveland pattern**—A committee of representatives from the BTEA and a committee from the AFL-CIO Building and Construction Trades Council meet and reach broad agreements on wages and conditions that are later specified in contracts between the dollar-and-cents ceiling as agreed upon between negotiators of BTEA and the Building Trades Council, but how much of the total is paid as wages and how much as fringes is decided between contractor associations and the craft unions with which they deal.

The basic agreements set the pattern for settlements as far east as Painesville in Lake County, as far south as the northern fringe of Akron in Summit County, and as far west as the outskirts of Lorain in Lorain County.

"I believe this unified demand and offer has over-all been extremely well satisfying to both sides," Mr. Hunkin observes. "I believe we've had far fewer strikes because of it. Probably some types of labor have gotten more increases through unified demand than they would have otherwise. But, on the whole, I don't think this kind of bargaining has disrupted any historical relationships.

"I am convinced that the same types of groups and same kind of policy making would work in other parts of the country and would go a long way toward stabilizing the wage trends in the industry."

• **Favors long-term contracts**—The key word to Bill Hunkin is "stabilization."

"I am very definitely in favor of long-term contracts," he says, "because I believe they tend to stabilize the industry. They prevent a contractor from finding himself committed to a project at one price and his costs spiralling upward. The contractor who does not establish a good duration-of-the-job contract or a long-term period contract is inviting major problems.

"Another reason long-term contracts are good is that they tend to reduce inter-city whipsaw of wage demands. They don't entirely eliminate such interactions, however. I am reasonably sure, for instance, that the 15-cents-an-hour increase in the first year of our contract will become the floor under negotiations in at least a half dozen other cities in this general area next year.

"But long-term contracts do tend to shift the arguments away from what seems to be the pivotal point of many union wage demands: 'What's the guy in the next town or the next craft getting and to hell with the facts of the situation in this town or this craft.' In deliberating long-term contracts, both sides tend to think of the long range and to balance the good and the bad.

"There are plenty of uncertain factors in this business at best. Labor costs, though, is the one that seemingly can drive a contractor further and faster away from projected costs than any other one. Everyone—contractors, workers, the government and taxpayers—would benefit greatly from a condition where contractors had knowledge of what, if any, labor cost increase would occur over the duration of a long-term job. It would certainly reduce the cushion inserted in bids to cover such contingencies."

When the previous three-year contract was negotiated in 1958, many BTEA contractors thought the settlement was high—37 cents over the three

USS Tiger Brand Wire Rope on cutter hoist operates in muck and salt water and is designed for severe service.

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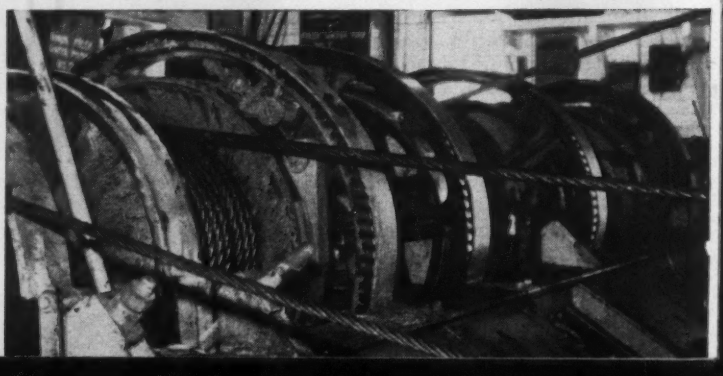

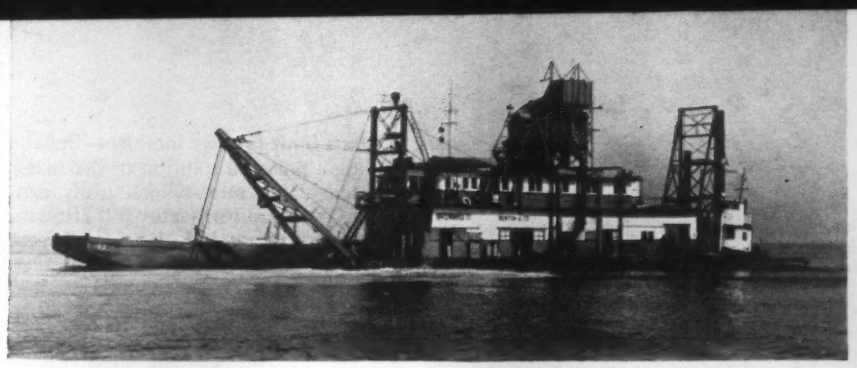

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The wire ropes for the swing lines and ladder hoist work constantly in and out of salt water. They are subject to corrosion, abrasion, severe loads, shock and fatigue. Other wire rope uses for spud hoist lines, gauge lines and main stays are less severe.

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Two dredges operate in this area: the *Broward II* owned by Benton & Co., is digging shells; the R. C. Huffman Construction Co. operates a similar dredge called *Number Three* which is filling in land for a new jet runway for the St. Petersburg International Airport. USS Tiger Brand Wire Rope for each dredge was supplied by the Gulf Coast Industrial Supply Co., St. Petersburg, Florida.

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years, 9 cents on June 18, 1958, 6 cents on Jan. 1, 1959, 10 cents on May 1, 1959, and finally 12 cents on May 1, 1960. However, at the conclusion of that contract, there was not a single employer who protested strongly about going into another three-year contract.

The reason is easy to find: What looked at first to be a high settlement proved to be a fair settlement compared with raises granted on a year by year basis in other places. As recently as four or five years ago, Cleveland was ranked among the three top wage-rate areas in the country, based on the average rate of the basic trades. In late 1960-early 1961, Cleveland had dropped to 12th place on this scale.

Cleveland contractors consider the new three-year, 45-cent contract only a moderately good settlement. "We might have gotten away without any increase this year on a one-year contract. But we might have let ourselves in for a greatly increased demand a year or two from now with such short-term contracts," Mr. Hunkin says.

• Sees no solution in productivity—"One thing for sure," he continues, "productivity improvements will not make up for more than 10% of wage increases of that magnitude. Certainly if you take a long-range enough view, productivity has increased tremendously. We built a railroad in Minnesota in '50 and '51 when labor rates averaged near $3.00 an hour. Yet the cost of building that railroad per mile was almost identical with costs of a railroad built in 1880 with Chinese labor getting probably 30 cents a day. This was a case of high-speed equipment versus coolies carrying baskets resulting in the same construction costs. The point is that almost all of the benefit of improved productivity has gone into labor rates.

"We went to the mat on work practices a few years ago and you don't see workers loafing now as you did then. Now, however, I don't see any substantial further gains which can be made in this area.

"Materials costs are going up, too, but not as much nor as fast as labor.

"The construction industry is hurting very badly and it's my conviction that the underlying reason is that a lot of contractors have been absorbing a large part of wage increases. That reduces profit margins to next to nothing. An increasing number of contractors are going broke. That frequently results from a contractor bidding too low and ignoring possible wage increases over the life of the job, then trying to absorb such increases when they come along.

"I believe prospects for improved productivity are 'fair'—but these are not the solution to the problem of rising costs."

"Area bargaining is one answer."

• Skeptical of national remedies—As interested as he is in finding the answer to the wage problem and others, Bill Hunkin is highly skeptical of Joint Appeals Board or other "national" solutions in the construction industry—except for federal wage controls, that is.

Take "no strike" pledges and the construction industry's machinery for the settlement of jurisdictional disputes for example.

"A 'no strike' pledge is only as good as the word of the man who makes it," says Mr. Hunkin. "And, frankly, I would not put very much faith in a 'no strike' pledge from anybody. It is too simple for a labor leader to say 'no more strikes.' A worker can always get sick, or go fishing, or loaf on the job. I have yet to see an international union police a 'no strike' pledge—even on such government jobs as those at Canaveral. The National Joint Board for the Settlement of Jurisdictional Disputes in the Construction Industry is doing a fine job. The only trouble, as I see it, is this: Who pays any attention to it?

"Jurisdictional disputes hurt no one but the contractor. Yet the contractor is powerless to defend himself, except to turn it over to an arbitration agency which itself is weak.

"The only practical solution in my mind is to put some teeth into the enforcement of 'no strike' pledges. A law should be written providing a heavy fine against a union for unauthorized strikes; and providing equally heavy penalties against a contractor for knowingly providing conditions which encourage jurisdictional disputes. Then, it would be up to an umpire to decide which side pays."

• Sees a limit to wage increases—But it's finding a practical solution to the major problem—labor rates—which really concerns Cleveland contractor Bill Hunkin. "The construction industry is the largest single industry in this country," he says. "It cuts across more boundaries and it affects more peoples' businesses than any other.

"Yet in this day of international struggle, this giant industry is establishing its wage policy on a hit or miss basis—with the result that nearly every area of the country has been hit hard at one time or another with bruising wage increases.

"The contractors have not had and do not have the power to resist the power of the unions. A longer strike against an isolated contractor simply means a higher settlement.

"The Associated General Contractors of America—the biggest single employer organization in the country—has been notoriously weak in drawing its membership together on this problem, to recognize the fact that the average wage rate throughout the country has risen considerably higher than it should be. Increases of 12 to 20 cents an hour year after year are bound to lead to costs of construction that will price us out of the market.

"Precisely when this will happen, I don't know. But I can't see a carpenter making $30 or $40 a day building a house that a machinist making $20 a day can afford to buy. Or, to look at it another way, if carpenters' wages increase 15 cents an hour for each of the next 10 years, the average rate would be on the order of $50 a day. How will any builder possibly be able to build a house at those wages that anyone is going to be able to buy?

• Urges stronger contractor associations—"The one thing I believe would do as much as any other toward alleviating this situation is a strong, concerted effort by the national AGC to aid in setting up strong regional contractor associations—like the BTEA—which would include the subcontractors and the specialty trades. These regional associations, able to assess the local building market, the supply and demand of labor, and pertinent local work and weather conditions, could do a much more effective job in area bargaining than is being done now.

"It's not a pat answer; it's not an easy answer. But I believe it could be an effective answer if employers all over the country would really get down and fight for it. Remember, the alternative, in my opinion, is the government telling both the worker and the employer how much the worker is going to earn an hour."

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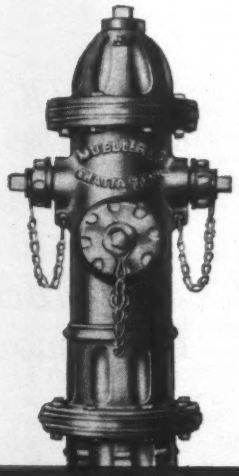

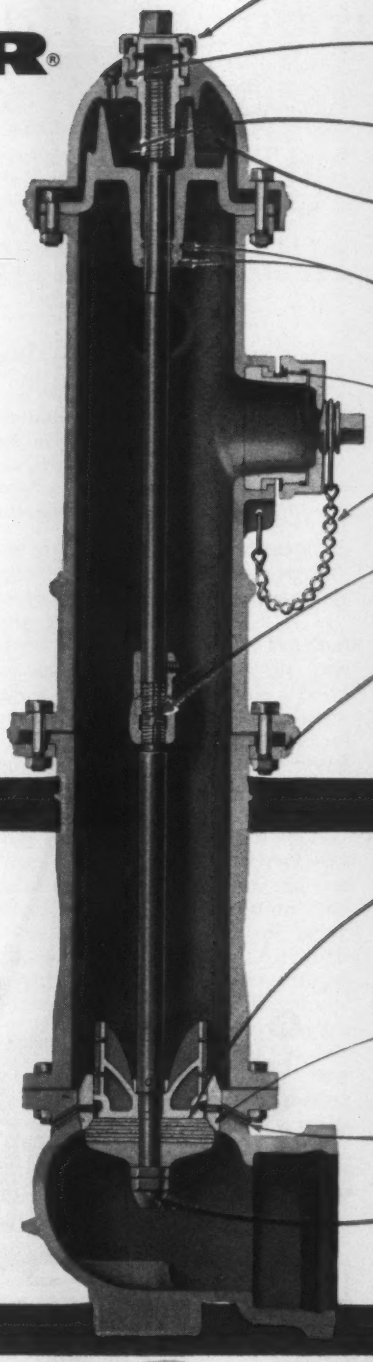

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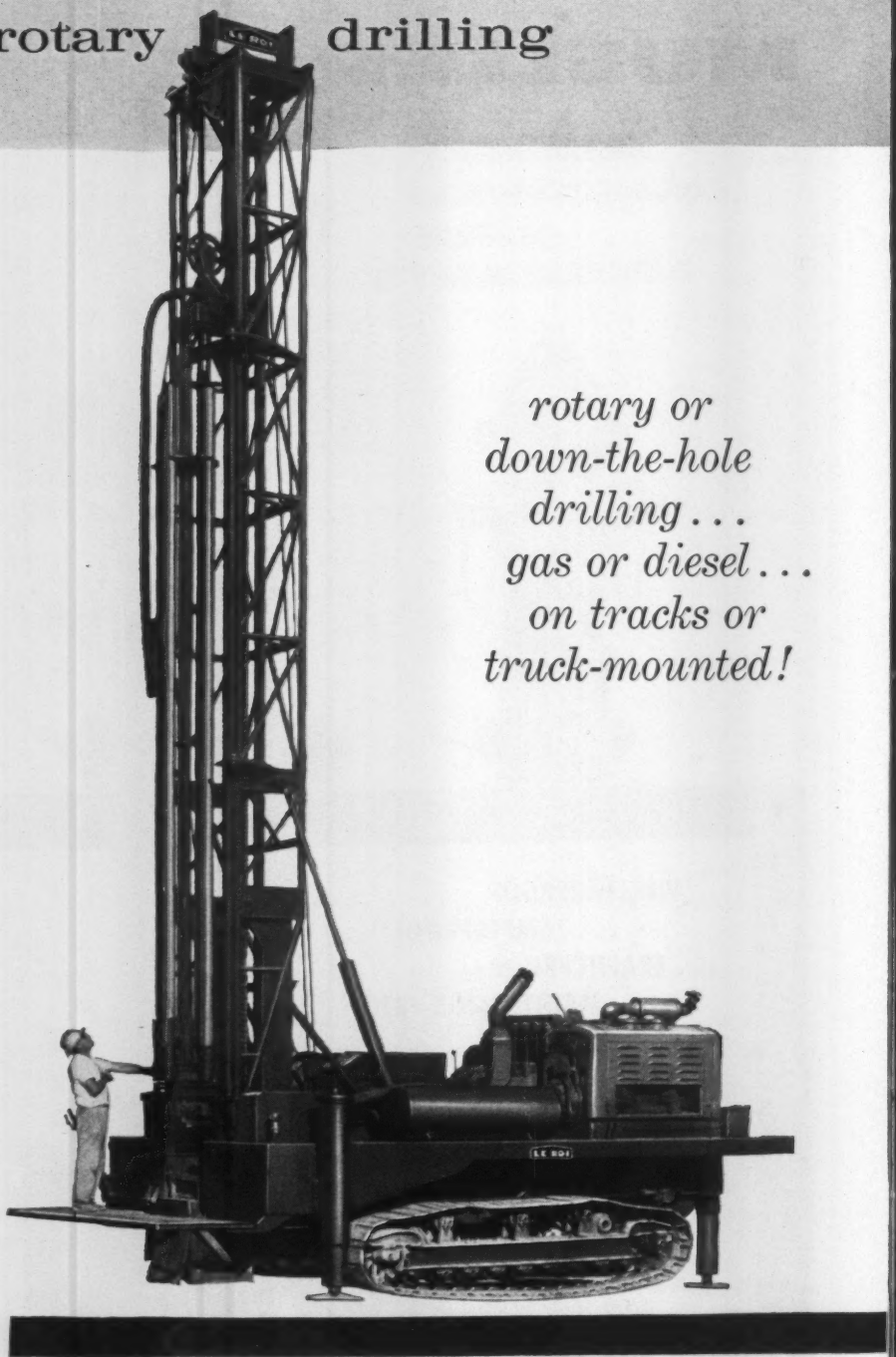

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No Liability for Bad Advice

A contractor is not liable—at least in Massachusetts—for false assurances to an owner if the assurances are merely statements of belief or opinion.

In a case that illustrates this rule, the purchasers of a building brought an action against the builder to have the contract of purchase rescinded. They contended that the builder informed the purchasers that he was installing a drain which would keep the basement floor dry. The purchasers were told they would have no further trouble with water and that the drain would solve the difficulty. The water problem was not solved. The trial court granted the purchasers judgment for rescission of the contract. This judgment was reversed by the appellate court,[1] which held that the builder's statements were not actionable.

The appellate court stated: "The substantial question is whether there was any misrepresentation, as distinguished from a statement promissory in character, for which plaintiffs (purchasers) may be relieved of their contract. The test is the same as that applied in actions of tort for deceit. Plumer v. Luce, 310 Mass. 789, 801-802, 39 N.E. 2d 961; Golding v. 108 Longwood Ave. Inc., 325 Mass. 465, 467, 91 N.E. 2d 342. In Yorke v. Taylor, 332 Mass. 368, at page 371, 124 N.E. 2d 912, at page 914 where there was an innocent misrepresentation as to the actual assessed value of real estate, the general rule was stated, 'In this commonwealth one who has been induced to enter into a contract in reliance upon a false though innocent representation of a material fact susceptible of knowledge which was made as of the party's own knowledge and was stated as a fact and not as a matter of opinion is entitled to rescission.'"

The trial court found that while the builder did not guarantee that the cellar would be dry after he installed the drain, "he gave assurances to the plaintiffs that this would solve the difficulty." As to this point the appellate court stated: "These representations, in our opinion, resemble the statement of the well digger that 'there would be definitely no chance of striking salt water,' which in Harris v. Delco Products, Inc., 305 Mass. 362, 365-366, 25 N.E. 2d 740, was held 'to amount to nothing more than an expression of strong belief.' We think that the present case falls within the ordinary rule that false statements of opinion, of conditions to exist in the future, or of matters promissory in nature are not actionable. See Loughery v. Central Trust Co., 258 Mass. 172, 175, 154 N.E. 383; Ernest F. Carlson Co. v. Fred T. Ley & Co. Inc., 269 Mass. 272, 277, 168 N.E. 812; Coe v. Ware, 271 Mass. 570, 573, 171 N.E. 732."

(1) Yerid v. Mason, 170 N.E. 2d 718, Supreme Judicial Court of Massachusetts, December 7, 1960.

Legal Technicalities Do Not Bar Recovery

Failure to obtain a permit or file a bond as required by law does not necessarily bar the right of a contractor to recover for the work he has done.

In a Massachusetts case, for example, a contractor sued to recover for services performed under an oral contract for blasting ledge.

A local statute required that the contractor obtain a permit for the performance of such work and file a bond before starting such work. The contractor failed to comply with these requirements and the owner interposed this defense to the action.

The court granted the contractor a recovery which was affirmed on appeal.[1] The court held that the contract was not illegal, in the sense that it was based on an illegal consideration, and that the work was capable of being performed in a legal manner. Although the contract was performed in an illegal way, it was not necessarily illegal.

The object of the statute was to see to it that the work would be properly done without damage to neighboring property and since the work was done without damage, the contractor was entitled to recover for the work done.

(1) Buccella v. Schuster, 164 N.E. 2d 141, Supreme Judicial Court of Massachusetts, February 3, 1960.

These summaries of court decisions are prepared by I. Vernon Werbin, Esq., New York attorney and licensed professional engineer, who is author of the following books published by McGraw-Hill Book Company, Inc.: *Legal Phases of Construction Contracts; Legal Guide for Contractors, Architects and Engineers;* and *Legal Cases for Contractors, Architects and Engineers.*

OFFICIAL PROPOSALS

Bids: August 31, 1961

The International Bridge Authority of Michigan

Advertisement for Proposals
Contract 8—Concrete Deck, Railings, Drainage and Electrical Work
for
American River Spans
of the
Sault Ste. Marie International Bridge

The International Bridge Authority will receive sealed proposals for the construction of Contract 8—Concrete Deck, Railings, Drainage and Electrical Work for American River Spans of the Sault Ste. Marie International Bridge until 10:00 A.M., Eastern Standard Time on the 31st of August 1961, at City Hall, Sault Ste. Marie, Michigan at which time and place proposals will be publicly opened and read aloud.

The work includes the construction of reinforced concrete deck with bituminous concrete wearing surface, ornamental steel handrails, pipe curbs, side barriers, drainage system and electrical facilities for one 4-span continuous truss unit with arch form top and bottom chords and a suspended roadway with two main spans each of 430 feet and end spans of 200 feet, one 3-span continuous girder unit with equal spans of 244 feet and one 4-span continuous girder unit with equal spans of 165 feet.

The Principal items of work include:

Bituminous Concrete (681 tons)	Lump Sum
Grade A Concrete Deck (1683 cu. yds.)	Lump Sum
Lightweight Concrete Deck (669 cu. yds.)	Lump Sum
Steel Reinforcement (551,402 lbs.)	Lump Sum
Galvanized Wrought Iron Pipe and Fittings	2600 Lin. Ft.
Bridge Railing—Fabrication, Erection and Painting (3575 Lin. Ft.)	Lump Sum
Bridge Railing with Side Barriers—Fabrication, Erection and Painting (1735 Lin. Ft.)	Lump Sum
Pipe Curb—Fabrication, Erection and Painting (5315 Lin. Ft.)	Lump Sum
Steel Conduit	13,100 Lin. Ft.
5000 Volt Cable	11,850 Lin. Ft.
Sound Powered Telephone Cable	6,200 Lin. Ft.
Sub-Station No. 1	Lump Sum
Service Boxes	33 Units
Roadway Lights	15 Units

Plans, Specifications, Proposal Form and Contract Documents for the work are on file in the office of Steinman, Boynton, Gronquist and London, Consulting Engineers, 117 Liberty Street, New York 6, New York and may be inspected by prospective bidders during office hours.

Plans, Specifications, Proposal Form and Contract Documents may be obtained from Steinman, Boynton, Gronquist and London, Consulting Engineers, 117 Liberty Street, New York 6, New York upon application and payment of a fee to Steinman, Boynton, Gronquist and London, of Thirty-five ($35.00) Dollars, Fifteen ($15.00) Dollars of which will be refunded upon return of the Plans to non-bidders, and all of which will be returned to bidders.

Bids must be made upon the proposal form included in the Contract Documents. Each proposal must be accompanied by draft or certified check payable to the order of the International Bridge Authority for the sum of Seventy Five Thousand ($75,000) Dollars.

Only United States Contractors may bid on this Contract.

All bidders shall be prequalified.

The right is reserved to reject any or all bids.

THE INTERNATIONAL BRIDGE AUTHORITY OF MICHIGAN
James E. Brophy, Chairman

July 26, 1961

District of Columbia—Highway Construction—Dept. of Highways & Traffic, D. C., July 24, 1961. CONSTRUCTION OF ROADWAY AND STRUCTURES, SOUTH APPROACH TO NEW WEST HIGHWAY BRIDGE OVER POTOMAC RIVER, VICINITY 14TH STREET, FEDERAL-AID PROJECT INTERSTATE I-95-1(30)0, Contract No. 5, Invitation No. C-622-H, consist. of approx. 8,248 lin. ft. combination portland cement concrete curb and gutter (9" curb); 1,377 cu. yds. structure concrete, class "BB" and 3,805 cu. ft. Class B, Stone Masonry. (Wage rates have been predetermined by Labor Dept.) Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Division, Procurement Office, D. C., Room 404, 499 Penn. Ave., N.W., upon deposit of a certified check for $60.00 per set, payable to D. C. Treasurer (Phone NA 8-6000, Ext. 448). SEALED BIDS to be opened 3:00 PM, EDT, August 22, 1961, in Room 424, 499 Penn. Ave., N.W.

Bids: August 24, 1961

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, Canal Law and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., advanced standard time, which is nine-thirty o'clock A.M., eastern standard time, on the 24th day of August 1961, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, F. J. Fuller, District Engineer, 353 Broadway, Albany, N. Y.						
Essex (Rte. 9N)	RC 61-137	Westport-Elizabethtown, S.H. 1496	5.92	Asphalt Concrete	$19,000 Plans $5	$330,000
DISTRICT No. 2, L. Ketchum, District Engineer, 109 No. Genesee St., Utica 1, N. Y.						
Herkimer	TC 61-3	Herkimer Village: Caroline Street, S.H. 48-12 Herkimer Village: State Street, S.H. 48-11	0.95	Traffic Signals	$5,000 Plans $5	91,000
Herkimer	M 61-8	Days Spillway—Barge Canal—Approx. ¾ Mile East of Utica City Line	....	Rehabilitation of Race Behind Spillway Headgate	$2,700 Plans $5	53,000
DISTRICT No. 3, E. E. Towlson, District Engineer, 333 E. Washington St., Syracuse, N. Y.						
Onondaga (Int. Trg. Rte. 281)	FISH 61-17	Interstate Route Connection 571 (Jamesville-Dewitt) Syracuse-Fayetteville, S.H. 5587 Proj. EACI-281-2(49)	2.52 (2.35 Acc.)	Asphalt Conc.=3.46 Mi.; Misc. Work=1.41 Mi.; Hgs Comp. I-Beam, 3 Sps. 162.75′ Tot.; 2 Triple Reinf. Conc. Box Br. 55′ Sp. Ea.; Double Reinf. Conc. Box Br. 42′ Sp.	$150,000 Plans $5	2,650,000
Oswego (Rte. 126)	FARC 61-108	Mapleview-Checkered House, S.H. 9284 Proj. S-522(2)	0.97	Asphalt Concrete, Type 1A	$8,500 Plans $5	152,000
Oswego	FASS 61-9	Bethel Corners-Hannibal (County Road) Proj. S-2(2)	4.43	Asphalt Concrete	$34,000 Plans $5	632,000
Seneca (Rte. 96)	FARC 61-30	Waterloo Village (Fayette St.) (S.H. 1399; Waterloo Village, S.H. 1211; Waterloo Village, S.H. 1211A Proj. F-626(7)	0.47	Asphalt Concrete, Type 2A, I-Beam Bridge 73.5′ Sp. Widening 2 Prestressed Conc. Brs.; 3 Sps. 86′ Tot. 2 Sps. 100′ Tot.	$23,000 Plans $5	422,000
Tompkins (Rte. 96)	FARC 61-103	Trumansburg Village, S.H. 5206 Proj. F-128(4); F-494(3)	1.56 (0.09 Acc.)	Asphalt Concrete, Type 2A=1.61 Mi.; Misc. Work=0.04 Mi.; Repairs to Stone Arch Bridge 28′ Span	$30,000 Plans $5	566,000
Tompkins (Rte. 227)	FARC 61-123	Perry City-Trumansburg, S.H. 5575 Proj. F494(4)	0.58	Asphalt Concrete, Type 1A	$6,000 Plans $5	102,000
DISTRICT No. 4, B. F. Perry, District Engineer, Barge Canal Terminal, Rochester, N. Y.						
Monroe	FATS 61-19	Rochester City: Inner Loop (FAC 60-7) (Front Street to North Street). (Proj. U-1089(15)	0.94	Traffic Signs	$3,800 Plans $5	69,000
Monroe	FASS 61-7	Mount Read Boulevard (County Road) Proj. S-587(1)	0.80 (0.47 Acc.)	Asphalt Concrete=1.23 Mi. Misc. Work=0.04 Mi.	$25,000 Plans $5	453,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, 65 Court Street, Buffalo, N. Y.						
Erie	FASCE 61-2	Scajaquada Creek Expressway (at Delaware Park) Proj. U-1087(5)	0.11	Pedestrian Overpass I-Beam 78′ Sp. Reinf. Conc. Ramps 524′	$9,000 Plans $5	169,000
Niagara (Int. Trg. Rte. 190 & Rte. 18D)	NIE 61-5 FINIE 61-4 FARC 61-129	Interstate Route 506, Niagara Expressway, Contract 5 (North Grand Island Bridge to Stephenson Ave.) Stephenson Ave. to Gill Creek) Porter Ave. Pt. 1, S.H. 1756 Porter Ave. Pt. 2, S.H. 1858 Proj. EACI-EACIG 190-1(43); S-606(2)	4.50 (5.29 Acc.)	9″ Cem. Conc. Pavt., 2 at 24′ Var.=4.02 Mi.; Asph. Conc.=0.43 Mi.; Misc. Work=0.05 Mi.; Access=1.53 Mi. Cem. Conc.; Pavt. & 3.76 Mi. Asph Conc.; 10 H.G.S. Comp. I-Beam, 3 Sps. 141.6′ Tot.; 4 Sps. 167.4′ Tot.; 3 Sps. 141.6′ Tot.; 4 Sps. 167.3′ Tot.; 3 Sps. 116.3′ Tot.; 3 Sps. 116.3′ Tot.; 3 Sps. 155.9′ Tot.; 3 Sps. 156.8′ Tot.; 3 Sps. 178.7′ Tot.; 3 Sps. 177.9′ Tot.; 2 H.G.S. Comp. Pl. Gird. Br., 3 Sps. 211.6′ Tot.; 3 Sps. 212.1′ Tot.; 2 RRGS Comp. I-Beam, 4 Sps. 229.5′ Tot.; 4 Sps. 229.5′ Tot.; 2 RRGS Comp. Pl. Gird., 7 Sps. 535.1′ Tot.; 7 Sps. 611.2′ Tot.	$570,000 Plans $10	10,374,000
Niagara	PSC 6607	Grade Crossing Elimination (Third Phase N.Y.C.R.R.; Erie R.R., Lehigh Valley R.R. Niagara Junction R.R.	....	Railroad Relocation; Miscellaneous R.R. Yard Work; 1—66′ Span R.R. Bridge (Steel Plate Girder) 1—Double Box R.C. Culvert; Miscellaneous Paving Work	$300,000 Plans $100 Large Size Only	5,515,000
DISTRICT No. 6, W. J. Dennis, District Engineer, 30 W. Main Street, Hornell, N. Y.						
Steuben (Rte. 371)	RC 61-120	Cohocton-Naples, Pt. 1, S.H. 5611	2.64	Asphalt Concrete=2.48 Mi. Misc. Work=0.16 Mi.	$15,000 Plans $5	262,000
DISTRICT NO. 8, M. N. Sinacori, District Engineer, Pleasant Valley Road, Poughkeepsie, N. Y.						
Dutchess	FAC 61-12 FARC 61-96	City of Poughkeepsie: North-South Arterial Highway Delafield Street, S.H. 1762. Proj. U-322(21)	2.46	Demolition	$11,000 Plans $5	192,000
Orange (Rte. 94)	RC 61-134	Newburgh-Woodbury, S.H. 42	0.01	Removal of Boulder	$120 Plans $5	2,000
DISTRICT No. 9, J. C. Frederick, District Engineer, 71 Frederick St., Binghamton, N. Y.						
Broome (Int. Trg. Rte. 81)	FIC 61-14	Interstate Route 505: Five Mile Point to Broad Avenue (Binghamton State Hospital to Broad Avenue) Proj. I-81-1(13)	0.89	Demolition	$3,500 Plans $5	61,000
Delaware (Rte. 10)	FARC 61-133	Colchester-Delancey, S.H. 1272; Delancey-Delhi, S.H. 1441. Proj. F-845(4)	5.35	Asphalt Concrete	$65,000 Plans $5	1,199,000
DISTRICT No. 10, A. M. Sarr, District Engineer, 325 W. Main St., Babylon, L. I., N. Y.						
Kings	FIBQE 61-1	Interstate Route Connection 512 Brooklyn-Queens Expressway, (Concord St. to Morgan Avenue) Contract 19. Proj. I-278-1(41)	3.30	Mall Barriers, Fencing, Landscaping, Misc. Work Rehabilitation of 2 Viaducts	$33,000 Plans $5	590,000
Nassau & Suffolk	FATS 61-20	Conduit Boulevard, Part 5, S.H. 5701A; Sunrise Highway Extension, Part 1, S.H. 8474; Sunrise Highway Extension, Part 2, S.H. E-8438; Sunrise Highway Extension, Part 2A, S.H. 8470. Proj. U-947(22)	4.37	Traffic Signs and Delineators	$12,000 Plans $5	223,000
Suffolk	FARC 61-135	Sunrise Highway Extension, S.H. 59-13; Sunrise Highway Extension, S.H. 57-22; Bridgehamton-Devon, Part 2, S.H. 1524. Proj. F-559(14)	4.04	Roadside Improvement	$7,000 Plans $5	127,000
Suffolk	FASS 61-8	William Floyd Parkway Extension (C.R. 46A); (Sunrise Highway Extension to Moriches-Middle Island Manorville Road). Proj. S-531(3)	2.25	Asphalt Concrete=2.13 Mi. Misc. Work=0.12 Mi.	$46,000 Plans $5	830,000
Suffolk	FIIB 61-2	Fire Island Inlet Bridge Superstructure (Contract 2)	0.80	Reinf. Conc. Slab Pavt.=0.80 Mi. Including Superstructure for 27 Span Bridge 3 Steel Arch Sps., 2 at 233.3′, 1 at 600′, 22 Steel Gird. Sps. at 138′ Ea., 2 Steel Sps. at 45′ Ea.	$220,000 Plans $5	3,956,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal Aid Highway Act. of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

If the deposit is $10.00 or more, full refund for one copy of the plans and specifications will be made to a bidder for the particular project, if such plans and specifications are returned in good condition within 30 days after the award of the contract or after the rejection of the proposal. The successful bidder is not required to return the copy of the plans and specifications in order to be entitled to such refund. If the deposit is $10.00 or more, partial refund will be made for the return of all other copies of plans and specifications in good condition within 30 days after the award of the contract or the rejection of the proposal.

Special attention of bidders is called to "Information for Bidders" in the Public Works Specifications, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as Amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Department of Public Works" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bid deposit, the execution of the contract and bond shall conform to the provisions of the Highway Law, as set forth in the "Information for Bidders".

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPT. OF PUBLIC WORKS

Bids: August 29, 1961

Cannonsville Bridge
Contract 464

SEALED BIDS will be received by the Board of Water Supply, at its offices, thirteenth floor, 120 Wall Street, New York City, until 11:00 A.M. Eastern Daylight Saving Time on Tuesday, August 29, 1961, for Contract 464, for the construction of the Cannonsville Bridge across the Cannonsville Reservoir, including short portions of the adjoining highway approaches. The Cannonsville Bridge will be a two lane highway bridge with a superstructure supported by six piers and two abutments. The piers and abutments will be founded on cast-in-place concrete piles and will be constructed of reinforced concrete with certain portions faced with granite. The superstructure will have a total length of 1,200 feet between abutment bearings and will consist of seven spans of structural steel girders and a deck of reinforced concrete. The deck will have a roadway surfaced with asphalt concrete and a safety walk with steel railing at each side. There are included in this contract approximately 360 linear feet of adjoining highway work on the southerly side and approximately 400 linear feet on the northerly side of the Cannonsville Bridge. These highway approaches to the bridge will be paved with asphalt concrete. All work shall be as set forth in the specifications.

Pamphlets of the contract can be obtained in the Secretary's office, Room 1312, at the above address, upon application in person or by mail, by depositing the sum of $10.00 for each pamphlet. There will be a charge of $1.50 to cover mailing costs for each set of contract pamphlets requested. For further particulars apply at the office of the Chief Engineer at the above address.

ARTHUR C. FORD, President, EDWARD C. MAGUIRE, HERBERT M. ROSENBERG, Commissioners; Board of Water Supply; MARTIN T. GERAGHTY, Chief Clerk.

Republic of Sudan
Shambat Bridge

The Minister of Local Government invites applications from firms of established international repute and experience in such work to be invited to tender for the design and construction of a reinforced concrete or steel roadway bridge across the River Nile between Omdurman and Shambat.

The bridge is to be about 720 metres long; and with approaches is about 1,458 metres long; the bridge is to have four 12 foot wide traffic lanes and two footways, with an overall width of 22.63 metres.

The preliminary drawings can be seen at the office of the Director, Ministry of Local Government, Khartoum, and the Consulting Engineers, Messrs. Coode and Partners, Abbey House, 2 Victoria Street, London, S.W. 1.

It is expected that tender documents will be issued to approved tenderers on the 17th. November 1961 and four months (and no more) will be allowed for the preparation of tenders.

Application to be invited to tender should be submitted to Director, Ministry of Local Government, Khartoum with copy to the Consulting Engineers on or before the 15th. September 1961, giving full details of the applicants' previous experience in the design and construction of such a bridge.

District of Columbia—Sewer & Tunnel Construction—Dept. of Sanitary Engineering, D. C., Office of the Potomac Interceptor, July 27, 1961. UNIT #4, THE FAIRFAX-LOUDOUN TUNNEL OF THE POTOMAC INTERCEPTOR SEWER, LOCATED NEAR THE POTOMAC RIVER AT THE FAIRFAX-LOUDOUN COUNTY LINE, VIRGINIA, Invitation No. C-624-S (Contract No. 18960), consisting of the following: TUNNEL CONSTRUCTION: 4,900 lin. ft. 72" i.d. concrete lined or concrete pipe in tunnel, including air and access shafts. OPEN CUT CONSTRUCTION: 800 lin. ft. 72" i.d. concrete sewer pipe installed in trench. ACCESS ROAD: 2,885 lin. ft. of graded gravel permanent access road. (Wage rates have been predetermined by Labor Dept.) Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Division, Procurement Office, D. C., Room 404, 499 Penn. Ave., N.W., upon deposit of a certified check for $50.00 per set, payable to D.C. Treasurer. (Phone NA 8-6000, Ext. 448). SEALED BIDS to be opened 3:00 PM, EDT, August 23, 1961, in Room 424, 499 Penn. Ave., N.W.

OFFICIAL PROPOSALS

AUSTRALIA

SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY

Tenders are invited for a Lump Sum and Schedule of Rates Contract for furnishing labour and material and performing all work for the design and construction in New South Wales, Australia of:—

CONTRACT NO. 20,065—MURRAY I PRESSURE PIPELINE

Murray I Pressure Pipeline comprises two steel pipelines each approximately 5,300 feet long and of largest diameter 13 feet 9 inches, together with distribution manifolds connecting the pipelines to eight Francis turbines. The maximum design head is approximately 1,900 feet. The design and construction of anchor blocks, piers and other ancillary works are included in the contract. Also included is the supply and delivery of approximately 900 feet of steel tunnel liner sections 13 feet 9 inches in diameter.

The successful tenderer will be required to undertake the whole of the responsibility for the design, fabrication, erection and testing of the pipelines and of all necessary ancillary works including all design and construction excepting preliminary excavation of the pipeline bench. Preliminary excavation of the pipeline bench has been carried out by the Authority and the bench will be available for inspection by intending tenderers. Concrete aggregate for the work will be supplied to the contractor at a fixed price per cubic yard.

LOCATION

The site is in the Snowy Mountains Area in the south-eastern part of the State of New South Wales, Australia, at approximately longitude 148°E and latitude 36°S. The elevation of the site varies between 2,000 and 4,000 feet above sea level.

RELATION TO OTHER WORK

Concurrently the Authority will have under construction the Murray I Pressure Tunnel and the Murray I Power Station, the sites of which are adjacent to the site of the pipeline. The Contractor for Murray I Pressure Pipeline will be required to deliver the steel tunnel liner sections to the Contractor for the Murray I Pressure Tunnel by a specified date. Concreting-in of the distribution manifolds on the pipeline will be carried out by the Power Station Contractor and the Contractor for the Pressure Pipeline is required to have the manifolds ready by specified dates for this concreting to proceed.

TENDER DOCUMENTS

Tender Documents consisting of the Form of Tender, Conditions of Tendering, General Conditions of Contract, Draft Form of Agreement, Schedules, Table of Estimated Quantities and Amounts, Specifications and Drawings will be available on 21st August 1961 and may be obtained by prospective Tenderers on payment of £10/-/-Australian or $22.50 U. S. per set on application to:—

Australian High Commissioner,
Royal Bank Chambers,
100 Sparks Street,
OTTAWA, ONTARIO, CANDA.

Australian Consulate-General,
International Building,
Rockefeller Centre,
636 Fifth Avenue,
NEW YORK, N. Y.
U.S.A.

Australian Consulate-General,
153 Kearney Street,
SAN FRANCISCO, CALIFORNIA,
U.S.A.

Liaison Officer,
Snowy Mountains Hydro-electric Authority
c/—United States Bureau of Reclamation,
Federal Center,
DENVER, COLORADO,
U.S.A.

Four additional sets of documents for purposes of tendering will be provided free of charge at the time of inspection of the site.

PRELIMINARY DEPOSIT

A preliminary deposit of £3,000/-/- Australian or $6,750.00 U. S. payable at Sydney, New South Wales, Australia, must be lodged with the tender for the contract.

INSPECTION OF THE SITE

Tenderers are required to inspect the site of the works and should communicate with the Snowy Mountains Authority, Cooma, New South Wales, Australia, regarding detailed arrangement.

GENERAL INFORMATION

For its own purposes the Authority has compiled certain information regarding the geology, hydrology and meteorology of the region and general information concerning local conditions. The information is not part of the tender documents. This information will be made available to Tenderers when they inspect the site.

SPECIAL QUALIFICATIONS REQUIRED OF TENDERERS

Consideration of tenders is dependent upon Tenderers having a background of successful achievement in the execution of the design, manufacture and erection of similar large pressure pipelines and possessing technical and other resources necessary to complete the work successfully within the contract period.

SUBMISSION OF TENDERS

Tenders for the contract must be submitted in duplicate in accordance with the Conditions of Tendering, enclosed in sealed envelopes appropriately endorsed with the contract number and name of the works tendered for, addressed to:—

The Business Manager
Snowy Mountains Hydro-electric Authority
Post Office Box 332
COOMA NORTH, N.S.W., AUSTRALIA

The tenders must be lodged in the Tender Box at Head Office of the Authority at Cooma or be sent by prepaid post in time to be delivered in ordinary course of mail by 12.00 noon on Monday, 5th February 1962.

K. See, Business Manager

OFFICIAL PROPOSALS

Bids: September 7, 1961

Town of Branford
Connecticut

ADVERTISEMENT

Sealed proposals for construction of Sewage Works will be received by the Sewer Authority in the Court Room of the Town Hall, Branford, Connecticut, until 8:00 P.M. Eastern Daylight Saving Time, on September 7, 1961, after which time they will be publicly opened and read aloud. No bids will be accepted after said hour. Proposals will be received on the following contracts:

Sewerage System, Easterly Section—Contract 3
Sewerage System, Westerly Section—Contract 4
Sewage Pumping Stations—Contract 5
Sewage Treatment Plant and Outfall Sewer—Contract 6

Information for Bidders, Proposal forms, Specimen Contract, Plans, Specifications and copies or specimens of all pertinent documents may be examined at the offices of Bowe, Albertson & Associates, Engineers, 75 West Street, New York, New York and at the Office of the Sewer Authority, 1078 Main Street, Branford, Connecticut, between 10:00 A.M. and 12:00 Noon and 1:00 P.M. and 3:00 P.M. daily except Saturdays, Sundays and holidays.

Copies of plans and specifications may be obtained at the Office of the Sewer Authority, and at the offices of the Engineers, upon making a deposit of Twenty-Five ($25.00) dollars, which will be refunded to bidders only who apply for a refund within thirty (30) days after the date proposals are opened and who return the plans in good condition.

Extra copies of plans and specifications may be obtained at a cost of Twenty ($20.00) dollars per set, which will not be refunded. Extra sheets of plans may be obtained at a cost of One ($1.00) dollar each, which will not be refunded.

A certified check or a cashier's check made payable to the order of the Sewer Authority, Town of Branford, Connecticut, or a duly executed bid bond in the amount of 5% of each bid must be deposited by the bidder with his bid as a guarantee that, in case a contract is awarded to him, he will execute such contract and furnish a satisfactory Performance and Labor and Material Bond. Acceptance of the bid will be contingent upon fulfillment of this requirement by the bidder and on failure to do so, he shall forfeit the deposit.

The Sewer Authority reserves the right to reject any or all bids, to waive any informalities or to accept the bid or bids which in its judgment will be for the best interests of the Town of Branford.

SEWER AUTHORITY
TOWN OF BRANFORD, CONNECTICUT
BY James C. Hartley
Chairman

Bids: September 19, 1961

Office of Purchasing Agent
City of Nashville, Tennessee
Project No. 12

Sealed bids will be received by the Purchasing Agent of the City of Nashville, Tennessee, at the office of the Purchasing Agent, until 10:00 A.M., Central Standard Time, on September 19, 1961, for Project No. 12—George Reyer Pumping Station Additions, all in accordance with plans and specifications which are on file at the office of the Director of the Nashville Waterworks Department, City Hall, Nashville, Tennessee, and also at the office of The Chester Engineers, 601 Suismon Street, Pittsburgh 12, Pennsylvania. Immediately after closing time for receipt of bids, they will be publicly opened and read aloud in the office of the Purchasing Agent, City Hall.

The successful bidder will be required to furnish satisfactory Performance and Labor and Materialmen's Bonds.

Copies of the plans and specifications may be obtained by depositing Fifty Dollars ($50.00) with the Engineers for each set of documents so obtained, the full amount of which will be refunded to each actual bidder, and Twenty-Five Dollars ($25.00) will be refunded to all others who return plans and specifications in good condition within ten (10) days after the opening of the bids. Equipment or material suppliers are not considered as actual bidders, and any plans taken out by such concerns will be eligible for a Twenty-Five Dollar ($25.00) refund per set of plans and specifications.

The right is reserved by the City of Nashville, through the Mayor, to reject any and all bids, to waive any informalities in the bids received, and to accept any bid which, in its opinion, may be for the best interest of the City.

A certified check or bank draft, payable to the City of Nashville, or a satisfactory bid bond executed by the bidder and a surety company, in an amount equal to Five Per Cent (5%) of the bid, shall be submitted with each bid.

No bid may be withdrawn for sixty (60) days after the scheduled closing time for the receipt of bids.

CITY OF NASHVILLE, TENNESSEE
E. B. SMITH,
Purchasing Agent

Rev.
3/61

Bids: September 19, 1961

Office of Purchasing Agents
City of Nashville, Tennessee
Project No. 8

Sealed bids will be received by the Purchasing Agent of the City of Nashville, Tennessee, at the office of the Purchasing Agent, until 10:00 A.M., Central Standard Time, on September 19, 1961, for Project No. 8—Heating Revisions and Additions, all in accordance with plans and specifications which are on file at the office of the Director of the Nashville Waterworks Department, City Hall, Nashville, Tennessee, and also at the office of The Chester Engineers, 601 Suismon Street, Pittsburgh 12, Pennsylvania. Immediately after closing time for receipt of bids, they will be publicly opened and read aloud in the office of the Purchasing Agent, City Hall.

The successful bidder will be required to furnish satisfactory Performance and Labor and Materialmen's Bonds.

Copies of the plans and specifications may be obtained by depositing Thirty-Five Dollars ($35.00) with the Engineers for each set of documents so obtained, the full amount of which will be refunded to each actual bidder, and Fifteen Dollars ($15.00) will be refunded to all others who return plans and specifications in good condition within ten (10) days after the opening of the bids. Equipment or material suppliers are not considered as actual bidders, and any plans taken out by such concerns will be eligible for a Fifteen Dollar ($15.00) refund per set of plans and specifications.

The right is reserved by the City of Nashville, through the Mayor, to reject any and all bids, to waive any informalities in the bids received, and to accept any bid which, in its opinion, may be for the best interest of the City.

A certified check or bank draft, payable to the City of Nashville, or a satisfactory bid bond executed by the bidder and a surety company, in an amount equal to Five Per Cent (5%) of the bid, shall be submitted with each bid.

No bid may be withdrawn for sixty (60) days after the scheduled closing time for the receipt of bids.

CITY OF NASHVILLE, TENNESSEE
E. B. SMITH
Purchasing Agent

Bids: September 19, 1961

Office of Purchasing Agent
City of Nashville, Tennessee
Project No. 11

Sealed bids will be received by the Purchasing Agent of the City of Nashville, Tennessee, at the office of the Purchasing Agent, until 10:00 A.M., Central Standard Time, on September 19, 1961, for Project No. 11—Improvements To Water Treatment Plant, General Construction, all in accordance with plans and specifications which are on file at the office of the Director of the Nashville Waterworks Department, City Hall, Nashville, Tennessee, and also at the office of The Chester Engineers, 601 Suismon Street, Pittsburgh 12, Pennsylvania. Immediately after closing time for receipt of bids, they will be publicly opened and read aloud in the office of the Purchasing Agent, City Hall.

The successful bidder will be required to furnish satisfactory Performance and Labor and Materialmen's Bonds.

Copies of the plans and specifications may be obtained by depositing One Hundred Dollars ($100.00) with the Engineers for each set of documents so obtained, the full amount of which will be refunded to each actual bidder, and Fifty Dollars ($50.00) will be refunded to all others who return plans and specifications in good condition within ten (10) days after the opening of the bids. Equipment or material suppliers are not considered as actual bidders, and any plans taken out by such concerns will be eligible for a Fifty Dollar ($50.00) refund per set of plans and specifications.

The right is reserved by the City of Nashville, through the Mayor, to reject any and all bids, to waive any informalities in the bids received, and to accept any bid which, in its opinion, may be for the best interest of the City.

A certified check or bank draft, payable to the City of Nashville, or a satisfactory bid bond executed by the bidder and a surety company, in an amount equal to Five Per Cent (5%) of the bid, shall be submitted with each bid.

No bid may be withdrawn for sixty (60) days after the scheduled closing time for the receipt of bids.

CITY OF NASHVILLE, TENNESSEE
E. B. SMITH,
Purchasing Agent

Bids: September 15, 1961

Pier and Bulkhead
Gallows Bay, Christiansted Harbor

PROJECT NO. SC-82
ST. CROIX, U. S. VIRGIN ISLANDS

Sealed bids will be received until 11 A.M. Atlantic Standard Time on Sept. 15, 1961 and then publicly opened by the Contracting Officer, Government of the Virgin Islands, Department of Property and Procurement, Old Grammar School Building, Christiansted, St. Croix, U. S. Virgin Islands, for the construction of a pier and bulkhead in Gallows Bay, Christiansted Harbor, St. Croix, U. S. Virgin Islands.

Information regarding bidding material, bid guarantee, and bonds, drawings and specifications and other contract documents are open for public inspection at the following locations:

1. Office of the Division of Procurement in Christiansted, St. Croix, U. S. Virgin Islands.
2. Office of Division of Procurement in Charlotte Amalie, St. Thomas, U. S. Virgin Islands.
3. Office of the Deputy Commissioner, Department of Public Works, Christiansted, St. Croix.
4. Office of the Commissioner, Department of Public Works, Charlotte Amalie, St. Thomas.
5. Office of the Public Works Advisor, Office of Territories, Room 6520, Interior Building, Washington, D. C.
6. Praeger-Kavanagh, 126 East 38th Street, New York 16, New York.

Plans and specifications may be procured from the Office of the Contracting Officer, Division of Procurement, either in Christiansted or Charlotte Amalie, or from the Office of Praeger-Kavanagh, New York, upon the deposit of $20.00. Deposit shall be only by certified check payable to the Government of the Virgin Islands, and deposits will not be refunded.

Each bid must be accompanied by a satisfactory bid guarantee in the amount of 5 percent of the total bid.

The successful bidder will be required to furnish performance and payment bonds, each in the amount of 100 percent of the contract price. Sureties must hold certificates of authority from the Secretary of the Treasury for bonding in the U. S. Virgin Islands. No bid may be withdrawn until 45 calendar days after the scheduled closing time to receive bids.

The Government of the Virgin Islands reserves the right to select the successful contractor or to refuse all bids or to pursue any other course which may be in the best interest of the Government of the Virgin Islands.

Contractors Watch This Section—

for new projects. Publish your announcements through the proposal sections of *Engineering News-Record* and get their bids.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5642) will be received at Ainsworth, Nebraska, until 10 a.m., Central Standard Time, September 6, 1961, for furnishing labor and materials for Earthwork, Concrete Lining and Structures, Ainsworth Canal, Section 1, Ainsworth Unit, Nebraska, Missouri River Basin Project. Location near Valentine, Nebraska. Principal items are 820,000 cu. yds. of excavation; 21,000 cu. yds. of concrete in canal lining and structures; 115,000 cu. yds. of compacting embankment; and other work. Completion time 700 days. For particulars, address Bureau of Reclamation, Building 46, Denver Federal Center, Denver 25, Colorado; P. O. Box 186, Ainsworth, Nebraska; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5638) will be received at Dillon, Montana, until 10 a.m., Mountain Standard Time, September 7, 1961, for furnishing labor and materials for Earthwork and Structures, Barratts Diversion Dam, East Bench Canal, Station 1+92.6 to Station 1302+00 and East Bench Laterals, 2.7 to 19.2 inclusive, East Bench Unit, Montana, Missouri River Basin Project. Location near Dillon, Montana, in Beaverhead County. Principal items are 2,758,000 cu. yds. excavation; 3,620 cu. yds. concrete; 262 Mbm timber in bridges; and other work. Completion time 700 days. For particulars, address Bureau of Reclamation, P. O. Box 870, Dillon, Montana; Regional Director, P. O. Box 2553, Billings, Montana; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5640) will be received at Lewiston, California, until 1 p.m., Pacific Standard Time, (2 p.m. Pacific Daylight Savings Time), September 19, 1961, for furnishing labor and materials for completion of Trinity, Clear Creek and Spring Creek Powerplants and Clear Creek switchyard, Trinity River Division, California, Central Valley Project. Location Trinity and Shasta Counties, California. Principal items are 12,482 cu. yds. concrete; 413,000 pounds, furnishing and installing miscellaneous metalwork; Lump sum, installing and testing six hydraulic turbines; Lump sum, erecting three 230-Kv. takeoff structures on transformer decks; Lump sum, installing nine single phase power transformers; and other work. Completion time, Trinity 590 days; Clear Creek 515 days and Spring Creek 665 days. For particulars, address Bureau of Reclamation, P. O. Box 2511, Sacramento 11, California; P. O. Box 247, Lewiston, California; or Building 53, Denver Federal Center, Denver, Colorado. Floyd E. Dominy, Commissioner.

OFFICIAL PROPOSAL

RATE: $2.70 per line (or fractional) per insertion.

CLOSING DATE: 10.30 a.m. Friday for issue out following Thursday.

SEND COPY: Official Proposal Division, Engineering News-Record, P. O. Box 12, New York 36, N. Y.

OFFICIAL PROPOSALS

Bids: August 22, 1961

Gates-Chili-Ogden Sewer District Monroe County Sewer Agency

Sealed bids for the construction of Sewage Pump Stations for the Gates-Chili-Ogden Sewer District, will be received by the Monroe County Sewer Agency at its office at 307 Terminal Building, 65 Broad Street, Rochester 14, New York until 11 o'clock E.D.S.T. on the 22nd day of August, 1961.

Bidding forms can be obtained and plans and specifications examined at the office of the Monroe County Sewer Agency, or the office of The Lozier Company, Engineers, 10 Gibbs Street, Rochester 4, New York.

Copies of plans and specifications may be obtained upon the payment of fifteen dollars ($15.00) for each set. The full amount charged will be returned to all bidders who return the complete plans and specifications in an acceptable condition within ten (10) days from the date of award to the successful contractor. Half of the amount charged will be returned to non-bidders who return the complete plans and specifications in an acceptable condition within ten (10) days from the date of award to the successful contractor. Checks or money orders should be made payable to the order of Gordon A. Howe, Monroe County Director of Finance.

The work consists of the construction of: SECTION "L"—Sewage Pump Station at two separate locations, as follows:

1. Scottsville-Chili Road (Town of Chili)
2. Whittier Road (Town of Ogden)

Bidders may bid on individual pump stations and on both pump stations combined. The Monroe County Sewer Agency reserves the right to award each pump station separately.

COUNTY OF MONROE
BY: C. A. Bennett
Purchasing Agent

August 2, 1961

Bids: August 24, 1961*

New York City Housing Authority

ADVERTISEMENT FOR BIDS
TOMPKINS HOUSES
PROJECT NO. NY-5-46

Sealed proposals will be received by the New York City Housing Authority, 299 Broadway, New York 7, N. Y., until 2:30 P.M. (E.D.T.) Thursday, August 24, 1961,* at which time said proposals will be opened and read in Room 312, for:

1. Foundations and General Construction
2. Heating and Ventilating
3. Electric Work
4. Plumbing
5. Elevators

For Tompkins Houses (Project No. NY-5-46), located in the area bounded generally by Park, Throop, Myrtle, and Tompkins Aves., in the Borough of Brooklyn, New York City.

A more complete description of the work and full information for bidders is contained in the Contract Documents. A deposit of $75 is required for documents for Nos. 1-4 reimbursement of $74 will be made upon their safe return. A deposit of $25 is required for documents for No. 5; reimbursement of $24 will be made for their safe return. Deposit may be made by cash or check payable to the Authority, at the cashier's office, 12th floor, 299 Broadway, and the documents obtained at 297A Broadway upon presentation of the cashier's receipt.

If a proposal is duly submitted by any person or corporation making the deposit required, the full amount of such deposit for one set will be returned to such person or corporation, provided that the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the proposal of such person or corporation. Upon return of any other sets in good condition within such period whether by a person or corporation duly submitting a proposal or by some other person or corporation, reimbursement will be made to the extent specified for each such set returned.

The Authority reserves the right to waive any informalities in the bids received, to reject any or all bids, and to award the contract only to those who, in accordance with the regulations and judgment of the Authority, are fully experienced in this type of work and have an adequate financial status. No prequalification is required for the above contracts.

NEW YORK CITY HOUSING AUTHORITY
William Reid, Chairman

* The Authority reserves the right to postpone the bid date.

OFFICIAL PROPOSALS

Bids: See Advertisement

The Port of New York Authority

Sealed proposals for the following work will be received at the Office of the Chief Engineer, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on date indicated, at which time said proposals will be opened and read in Room 1108.

Contract EBP-507.217—Erie-Basin Port Authority Piers—Existing Piers 44, 45 & 46—Borings—No deposit required—Bids will be received until 2:30 P.M. on Thursday, August 24, 1961.

Contract GWB-190.049—George Washington Bridge—Lower Level Expansion—Sealing of Roadway Joints—Deposit $30.00 per set of documents—Bids will be received until 2:30 P.M. on Tuesday, August 29, 1961.

Contract EP-110.021—Elizabeth-Port Authority Piers—Access Road Connection to McLester Street—No deposit required—Bids will be received until 2:30 P.M. on Thursday, August 24, 1961.

Contract AK-140.001—Outerbridge Crossing—Roadway Widening—Deposit $50.00 per set of documents—Bids will be received until 2:30 P.M. on Thursday, September 7, 1961.

Contract documents may be seen at the Office of the Assistant Chief Engineer for Design, Room 1115, 111 Eighth Avenue, New York 11, N. Y. Documents will be furnished upon receipt of the above deposit (each set including one copy of the Contract Drawings) for not more than three sets to any one company. Additional sets will be furnished upon payment of an amount for each set equal to the deposit indicated above, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt will be issued. The receipt shall be delivered to Room 1115, where the documents will be furnished.

Those who have submitted a bid on the Contract directly to the Authority will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
S. Sloan Colt, Chairman

New York, August 10, 1961

Bids: August 28, 1961

The Port of New York Authority

ERIE BASIN PORT AUTHORITY PIERS, PORT AUTHORITY GRAIN TERMINAL
AND
PORT AUTHORITY COLUMBIA STREET PIER
FENDER SYSTEM REPAIRS
CONTRACT O & M 576

Sealed proposals for the repair to the fender system at Piers 1, 2 and 3 and Bulkhead—Erie Basin Port Authority Piers, the Port Authority Grain Terminal and the Port Authority Columbia Street Pier will be received at the office of the Department of Purchase and Administrative Services of The Port of New York Authority, Room 900, 111 Eighth Avenue, New York 11, New York, until 11:00 A.M. o'clock Monday, August 28, 1961, at which time and place said proposals will be opened and read.

Contract documents may be seen at the office of the Department of Purchase and Administrative Services, Room 900, and copies will be furnished upon deposit of $10.00 per set. Deposit must be delivered to Treasury Department, Room 1001, where a receipt will be issued. The receipt is then to be delivered to the Department of Purchase and Administrative Services, who will furnish the contract documents. The deposit will be remitted if the documents are returned in good condition, not later than thirty days after the opening of Proposals. The deposit will be forfeited if the documents are not returned within thirty days.

THE PORT OF NEW YORK AUTHORITY
S. Sloan Colt
Chairman

New York, August 10, 1961

Read the Official Proposal Columns of ENGINEERING NEWS-RECORD This Week and Every Week

EMPLOYMENT NATIONAL COVERAGE OPPORTUNITIES

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The advertising rate is $45.20 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

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Subject to Agency Commission.

AUGUST 24TH ISSUE CLOSES AUGUST 14TH

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Position Wanted ads take ½ of above rate.

Box numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

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Send NEW Ads and Inquiries to Classified Advertising Division of ENGINEERING NEWS-RECORD, P. O. Box 12, N. Y. 36

ADDRESS BOX NO. REPLIES TO: Box No.
Classified Adv. Div. of this publication.
Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 645 N. Michigan Ave.
SAN FRANCISCO 11: 255 California St.

• POSITIONS VACANT

Structural Engineer-Midwest consulting firm seeks Ph.D. to design complex steel structures, reinforced and prestressed concrete. Preference will be given to applicants with practical experience. Permanent position with established firm in business since 1929. Moving expenses paid. Send resume, including education, experience, and personal qualifications to P-6245. Engineering News-Record.

Sanitary Engineer. Opportunity to assume overall supervision and client contact on sanitary projects for long-established midwestern consulting engineering firm. Experience in all phases of sanitary work is desired. Send complete resume of experience and qualifications. Replies held in strictest confidence. Our employees know of this advertisement. P-7178, Engineering News-Record.

Wanted: Civil Engineer with water and sewage treatment design experience—location Mid-west. Submit complete resume, salary and availability. Write P-7189, Engineering News-Record.

Estimators—Civil, Mech., Electrical: Checking change orders. Please send resume. All replies confidential. P-7176, Engineering News-Record.

Materials Engineers. Graduate or registered. Well versed in testing & control of soils, concrete, and bituminous mixes; familiar with current American highway construction practice. Age 35-50. Salary $9,000 to $12,000; moving allowance. Location east or south (possibly foreign at increased rates). Complete resumes to P-7159, Engineering News-Record.

Civil or Architectural Engineer. Challenging structural design position in an expanding international company. Headquarters in Sioux City, Iowa. Send resume to P-7154, Engineering News-Record.

Detailers, Structural Steel—Fully experienced only—permanent positions—New England Iron Works, P. O. Box 955, New Haven, Connecticut.

Materials Engineer with Civil Engineering degree and considerable experience in soils and materials testing, design of mixes, exploration for construction materials, etc. Salary range $144.50 to $203.50 per week. Experience and other qualifications will be considered in establishing starting salary. Apply, Employment Manager, The Zia Company, Los Alamos, New Mexico.

Project Engineer, permanent position with established airport engineering firm. Applicant must know airport layout and criteria and have experience in design or construction. Ability write reports and work with high officials required. Openings South America and Middle East. Salary open. Airways Engineering Corp., 1212-18th St., N. W., Washington 6, D. C.

Engineer, Civil-Structural. Minimum 5 years responsible design experience in structures, bridges and foundations. Excellent opportunity in established organization for a competent engineer with initiative and leadership potential. Before interview, please send complete resume of education, experience and qualifications including salary expected to Charles W. Yoder & Associates, 3505 W. Center St., Milwaukee 10, Wis.

• POSITIONS VACANT

Engineer Designer—Permanent career opportunity for qualified engineer experienced in design and operation of aggregate plants, central mix concrete plants, and related materials facilities. East coast location with multi-plant operator. P-7090, Engineering News-Record.

Engineer with estimating and management experience for general contractors office doing industrial and public works building. Excellent opportunity. State age, experience and references. Our employees know of this ad. Midwest location. P-7062, Engineering News-Record.

Engineers, Sanitary Design—2 to 5 years experience in layout of water and sewage treatment plants, including equipment and piping arrangements. N. Y. City consulting office. P-7079, Engineering News-Record.

Openings for recent Civil Engineer graduates with military obligations completed who desire to learn the construction business. Must be ambitious, aggressive, dependable, use no intoxicants, willing to start in the field on industrial buildings, defense construction, heavy construction, and willing to move. Preferably single. We operate throughout Kansas and adjacent states; offer excellent opportunity for advancement. Martin K. Eby Construction Co., Inc., P. O. Box 1679, Wichita, Kansas.

Permanent openings for Resident Engineers experienced in supervision of construction of large steam power plants and/or high-voltage transmission lines. Degree and registration desirable. Excellent opportunity with consulting engineering firm. Please send resume of education and experience to P-7228, Engineering News-Record.

Materials Engineer: concrete, asphalt, aggregates. Commercial laboratory, N. Y. Metropolitan area. P-7223, Engineering News-Record.

Superintendent Experienced in gas and telephone line construction—Eastern location. P-7196, Engineering News-Record.

Director of Engineering, Ph. D. degree in the field of E.E. or M.E. preferred. Will consider applicant with Master's degree and considerable experience. Responsible for administration and development of four engineering departments. Salary $11,000 up. Location Middle-South. P-7238, Engineering News-Record.

Professor or Associate Professor of Electrical Engineering to teach courses in Electric Circuits and Energy Conversion. Must have Master's Degree in Electrical Engineering. Salary up to $9000, for nine-month tenure. Location Middle-South. P-7240, Engineering News-Record.

Assistant Professor, Electrical Engineering to teach fundamental courses in Electrical Engineering. Must have Master's degree. Salary up to $7200, for nine-month tenure. Location Middle-South. P-7242, Engineering News-Record.

Engineers experienced in design of water and sewage projects. Location, Ohio. Send complete resume and salary requirement. P-7218, Engineering News-Record.

Superintendent-Estimator. Management opportunity with New York construction company. Experience in estimating, proposal preparation and sub-contract negotiations on lump sum projects. Reply in full confidence to P-7219, Engineering News-Record.

• POSITIONS VACANT

Superintendent of Equipment and Master Mechanic, to take charge of maintenance and repair of non-union paving and excavating company in the Metropolitan Washington, D. C. area. Send resume to P-7210, Engineering News-Record.

Recent Civil Engineer Graduate military service complete. Desire permanent employee seeking opportunity to grow with small expanding firm in N. Y. metropolitan area. Will eventually handle all phases of construction business. Write P.O. Box 2073, Glenbrook, Conn.

Civil Engineer—experienced in subdivision and utility lines design and calculations. Salary according to ability. Robinson Surveying and Engineering Co., 110 W. 13th Ave., Denver, Colo.

Applications being taken for a Graduate Civil Engineer, at least one year's experience on design, surveying or supervision of construction. Apply personally, Department Public Works, 48 North Park, Lombard, Illinois.

• POSITIONS WANTED

General Superintendent-Proj. Mgr. Hvy Const. roads, bridges, bldgs, flood control tunnels, sewage & sewage disp. Concrete mech. background. PO Box 48 Clayton 5 Mo.

Chief Estimator—25 yrs. experience Bldg. Const. — best references — desires position with General Contractor in South. Fully qualified for complete charge projects bidding stage to completion. Minimum salary $12,000. Will relocate to suit. PW-7018, Engineering News-Record.

Executive, 16 yrs const exp, capable administrator, mgr, atty, efficient coordinator, govt contracts. PW-7093, Engineering News-Record.

Attorney-Construction Specialist seeks corporate position, or with law office engaged in heavy contracting arbitration, litigation. Technical-practical background in industry custom and usage. Government labor experience. PW-7140, Engineering News-Record.

Registered (2 states) Str. Civil. 30 years exp. 14 years supervision in bridges, buildings, hwys. Associate acceptable. PW-7185, Engineering News-Record.

Cost Accountant—14 years experience 5 of which were in the construction field. Married, white, 41 years of age. PW-7180, Engineering News-Record.

Project Manager — Experienced — Public Works. Penna. or New York area. PW-7158, Engineering News-Record.

Structural Engineer and Architect—Registered in Illinois. Extensive experience. Position as Chief Engineer or partnership. PW-7193, Engineering News-Record.

Construction Estimator, 58, A-1 ability. Can take full charge of bid. Fully experienced all phases & types of bldg. const'n, sub-contract neg., purchases, exped'g costs. Min. $12,000. PW-7145, Engineering News-Record.

Project Manager, entire supervision, contract admin., methods & equipment, estimates, 24 yrs. exp. hvy-constr. major projects U.S. & O.S. PW-7128, Engineering News-Record.

(Continued on opposite page)

GRAVER

has excellent openings for the following list of qualified personnel:

Junior and Senior Estimating Engineers
Stress Analysts (Research)
Chemical Engineers (Research)
Welding Development Engineers
Metallurgical Engineers
Design Engineers (Plate Structures)
Junior and Senior Contracts Engineers

All of the above should hold degrees and their training and experience should be on structural design as related to large plate structures; such as, field erected containers, towers, stacks, etc. Address all applications to: Industrial Relations Department,

GRAVER TANK & MFG. CO.
Division—Union Tank Car Company,
35 East Wacker Drive, Chicago 1, Illinois

FIELD ENGINEER

Nationally known organization offers excellent opportunity for young civil engineer graduate. Engineering consulting and promotional work in highway and concrete fields. Location Ohio, Western Pennsylvania and Kentucky area. Car allowance and expenses. Permanent position. Salary based on qualifications and experience.

P-6996, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

• *POSITIONS WANTED*

(Continued from opposite page)

Yng Woman, Admin. Asst., Gal Fri. Exec. Secty, considerable exper. all phases genl constr. office, knowl. steno, typg., bookpg., plans, specs, & expedtg. Background in purch. includ. very hvy contact w/subs & suppliers. Excelnt. knowl. subcontracts. Faml. w/biddg procedures, requisitions & submission shop dwgs., etc. Prefer Manhattan office. PW-7143, Engineering News-Record.

Construction Supt. Heavy Construction. PW-4482, Engineering News-Record.

Production Supt. Structural Steel Fabrication 34 years M.E., capable of coordinating detailing with fabrication. Experienced controlling and expediting production of riveted and/or welded buildings, trusses, girders, ridged frames etc. Min. $15,000 per year. PW-7205, Engineering News-Record.

Construction Manager-Field Engineer, BSCE, Reg. P.E., 28, 6 yrs. exp. complete supervision of commercial, industrial and sanitation facilities; estimating and design. Desire challenging position with general contractor. PW-7206, Engineering News-Record.

Senior Estimator, Project Manager, buildings and industrial construction, seeks permanent career opportunity. Degree and 8 years Big Company experience. Military complete. Reply to PW-7234, Engineering News-Record.

Civil Engineer: 59, broad exp.; specifications & supervision const. specialties; Ohio-N. Y. area. PW-7227, Engineering News-Record.

Retired Consultant, 55, very productive, adequate capital, seeks association with established engineering firm, New York City area. PW-7211, Engineering News-Record.

Executive 35—12 years all phases Building Construction, currently officer medium size firm heavy in industrial relations & contract work. PW-7212, Engineering News-Record.

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the box number when answering advertisements. It is the only way we can identify the advertiser to whom you are writing.

ENGINEERING DESIGN PERSONNEL

Highway & Bridge Designers, Highway & Bridge Draftsmen

Career opportunities for individuals interested in professional recognition ample opportunity for advancement based on merit, plus group life insurance, hospitalization, paid vacation and holidays.

EXPERIENCE REQUIRED

Mail Resume To F. W. Ahern, Personnel Director

MICHAEL BAKER, JR., INC.
Consulting Engineers
Baker Building **Phone: SPruce 4-3010** **Rochester, Penna.**

GENERAL MANAGER
CRUSHED STONE QUARRY OPERATION

*** Ready Mix and Bituminous Concrete**
*** Precast Pipe and Prestressed Concrete**

Nationally known diversified operation has immediate opening for proven management executive experienced in this field.

The man we seek must have had responsibility for the direction and management of all phases of the business—mining, manufacturing, distribution, purchasing, sales and administration services; as well as ability to promote growth from present $4,000,000 annual sales to its highest potential in active market area.

Salary, and supplemental benefits programs will be commensurate with experience and responsibility. Position offers good opportunity for advancement to successful applicant. Send complete resume of your experience, education and other qualifications to:

P-7134, Engineering News-Record
Classified Adv. Div., P. O. Box 12, New York 36, N. Y.

Superintendent
Crushed Stone Operation

Nationally known diversified corporation has immediate opening for a superintendent in one of its quarry and bituminous concrete operations.

Experience in this type operation with responsibility for production, maintenance, quality, labor relations, etc. is essential to qualify.

Salary and supplemental benefits program will be commensurate with experience and responsibility. Send complete resume of your experience, education and other qualifications to—

P-7171, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

SOILS ENGINEERS

Two engineers with MSCE (Soils Mechanics) Degree plus minimum of two years experience in design.
Four engineers with MSCE (Soils Mechanics) and no experience or BSCE with minimum of two years design experience in soils mechanics.
Will consider more experienced men for above or higher positions providing the previous experience has been in design of dams and hydraulic structures.
Please send complete resume to Personnel Manager.

HARZA ENGINEERING CO.
400 West Madison Street, Chicago 6, Ill.

Put Yourself in the Other Fellow's Place

TO EMPLOYERS - TO EMPLOYEES

Letters written offering Employment or applying for same are written with the hope of satisfying a current need. An answer, regardless of whether it is favorable or not, is usually expected.

Mr. Employer, won't you remove the mystery about the status of an employee's application by acknowledging all applicants and not just the promising candidates.

Mr. Employee you, too, can help by acknowledging applications and job offers. This would encourage more companies to answer position wanted ads in this section.

We make this suggestion in a spirit of helpful cooperation between employers and employees.

This section will be the more useful to all as a result of this consideration.

Classified Advertising Division

McGRAW-HILL PUBLISHING CO., INC.
330 West 42nd St., New York 36, N. Y.

Concrete Pipe
Plant Superintendent

Nationally known diversified corporation has immediate opening for a superintendent in one of its concrete pipe plant operations. To qualify applicant must have experience with McCracken machine concrete pipe production and maintenance and be capable of assuming responsibility for quality, labor relations, etc.

Salary and supplemental benefits program will be commensurate with experience and responsibility. Send complete resume of your experience, education and other qualifications to

P7172 Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

REPRESENTATIVE WANTED

On commission basis to sell to municipalities. No investment required in money or inventory. Must have established contacts in field. Send resume and territory desired.

RW-7222, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

SEARCHLIGHT SECTION

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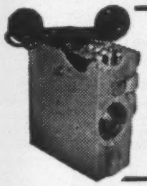

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ENR—T1/3

New Facets to Foreign Aid

As CONGRESSIONAL MACHINERY slowly moves the Administration's foreign aid bill nearer to the voting stage it becomes clear that some new facets to the foreign aid program that will be of particular interest to the construction industry are being readied:

First will be the increased emphasis on aid to Latin American countries, where American engineers and constructors will be on more familiar grounds than they were initially in, say, the Middle East.

Plans to earmark large amounts of money for the new independent countries of Africa will, at the same time, afford plenty of scope for construction pioneering.

And a third facet of prime construction interest is the possibility that Congress may finally approve long-term commitments on foreign aid projects.

Insofar as the bill itself is concerned, the proposed five-year financing plan for long-term projects is by far the most radical feature. And it may well be of greatest significance to the construction industry since it would permit large-scale projects to be planned and carried out with greater efficiency and economy. President Kennedy's plan to pay for long-term foreign aid through Treasury financing instead of by direct Congressional appropriation is meeting some opposition, but some form of compromise may yet permit the long-term commitment idea to be approved. It would be of definite advantage to the foreign aid program if it could.

The proposal to funnel large amounts of foreign aid funds into Latin America and Africa while continuing to maintain a strong program in Southeast Asia, should considerably broaden the range of projects undertaken. For the small, almost undeveloped countries, piped water supplies, simple roads, schools, modest river wharfs, hospitals and clinic buildings would be among the favored facilities. The farther advanced nations would need comparably larger projects, including main traffic arteries, road or rail, power and water supply dams and even industrial facilities.

The one big open question on the Kennedy foreign aid program relates to the opportunities it will afford or deny to private investment. In the beginning, last spring, considerable emphasis was going to be placed on private funds as well as on the Development Loan Fund. As policy has progressively been spelled out, less is heard of these sources and more of direct grants to foster social and political change and improvement in the various countries. This is held to be a necessity to thwart Communist expansion in these countries, but it will be a mistake if it also thwarts private U.S. investment in these countries, and the useful development that that can bring about.

The U. S. construction industry has played a prominent role in the foreign aid programs of the past. Its manpower and machines will be no less important in the future, but in many instances will be employed differently than before. New facets to foreign aid suggest that it would be the part of wisdom to be prepared for whatever new requirements may be imposed.

Learning From Failures

STRUCTURAL FAILURES are sometimes tragic, always embarrassing events. Too often, those associated with a project on which a failure has occurred are reluctant to discuss the possible causes or the results of investigations. As a consequence, the construction industry loses some valuable lessons

An exception to this unfortunate rule is the handling of the investigation of the construction collapse of a prestressed concrete building near Harrisonburg, Va., which killed five workmen (ENR Dec. 1, 1960, p. 30). Both the architect and the fabricator-erector have now released detailed engineering reports analyzing the collapse (ENR Dec. 15, 1960, p. 30 and ENR Aug. 3, p. 22). The precast concrete industry is thus afforded an opportunity to benefit from the failure.

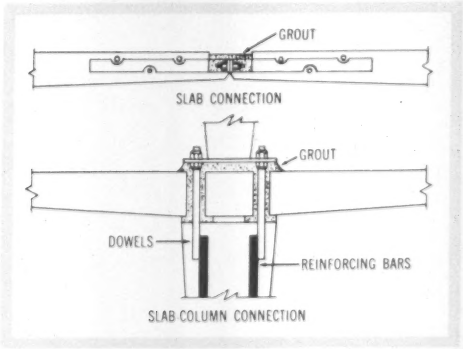
This is true even though the investigating teams arrived at contradictory conclusions. The contractor's investigators attribute the collapse to bearing failures at the beam-column connections, and the architect's investigators blame faulty erection procedures.

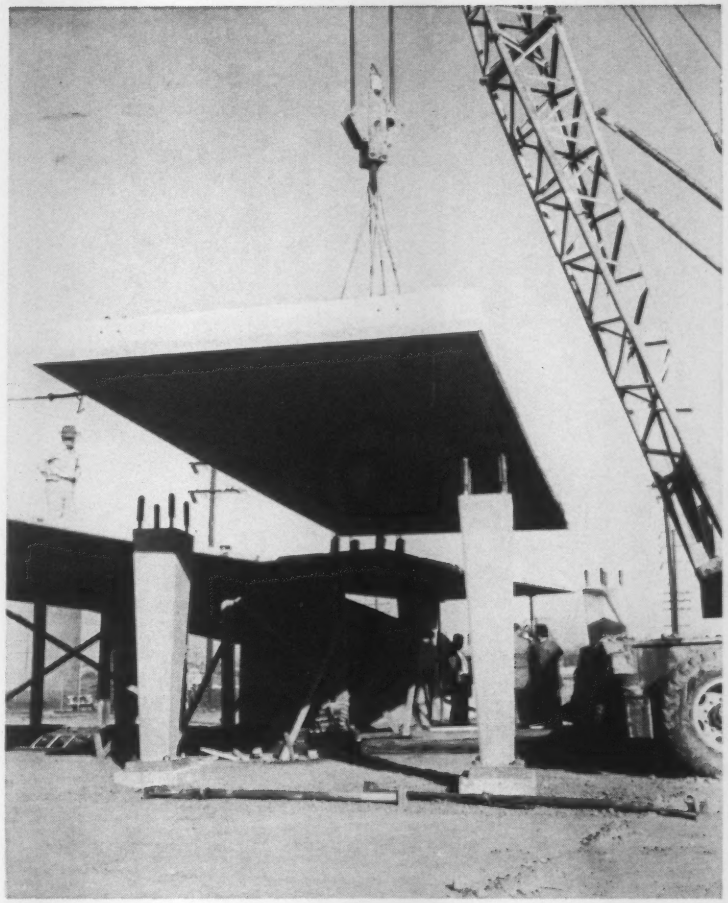
The main issue in the Harrisonburg collapse concerns the design of the bearing detail at the beam-column connections. The contractor's investigators computed the temporary bearing stress at the columns to be nearly three times that allowed by ACI 318-56 for edge load bearing on reinforced concrete. The architect's investigators, on the other hand, uphold the structural engineer's claim that this temporary bearing between steel angles cast in the beams and columns could be designed for the higher allowable bearing stress recommended for post-tensioning anchorages.

In view of these divergent viewpoints it is clear that the problem of beam-column connection design in prestressed concrete structures merits careful attention. More broadly the Harrisonburg failure also suggests a need for tightening up procedures with respect to:

- The responsibility of architects and engineers in writing detailed specifications, approving shop drawings and inspecting fabrication and erection procedures.
- The responsibility of the contractor for structural safety during erection.

These are perennial problems, not restricted to any one material, although they are more acute in a new field like prestressed, precast concrete. All concerned should insist on rigorous, clear definitions of responsibility and provisions for plant and field inspection in contract documents.





PHOTOS THROUGH COURTESY OF TISHMAN RESEARCH CORPORATION, NEW YORK, N. Y., DESIGNERS AND DEVELOPERS OF TIERPARK GARAGES

5000 psi in sixteen hours with SIKA SET

Grout and dry pack mortar with rapid strength development and minimal shrinkage is essential for the fast erection of the new Tierpark Parking Structures developed by Tishman Research Corporation. Composed of only three elements — slabs, columns and ramps — a Tierpark structure is erected within a matter of days.

Mix proportions for high strength grout and dry pack mortar were developed at the Sika Concrete Laboratory. Sika Set liquid, diluted 1:3, added to the dry pack produced compressive strengths exceeding 5000 psi at sixteen hours. Sika Set, diluted 1:4, added to the poured grout produced compressive strengths exceeding 3000 psi at sixteen hours. Proportions of 1 part Type III cement to 1-1/2 parts sand were used.

Structural concrete was initially retarded by the use of Plastiment Retarding Densifier to facilitate finishing — with rapid strength gain as an added bonus to the manufacturer of the precast, prestressed elements.

For full details on Sika Set Shrinkage Reducing Accelerator and Plastiment Retarding Densifier ask for your copies of SET-661 and PCD-59. Offices and dealers in principal cities, sixteen affiliate manufacturing companies around the world. In Canada, Sika Chemical of Canada, Ltd.; in Latin America, Sika Panama, S. A.

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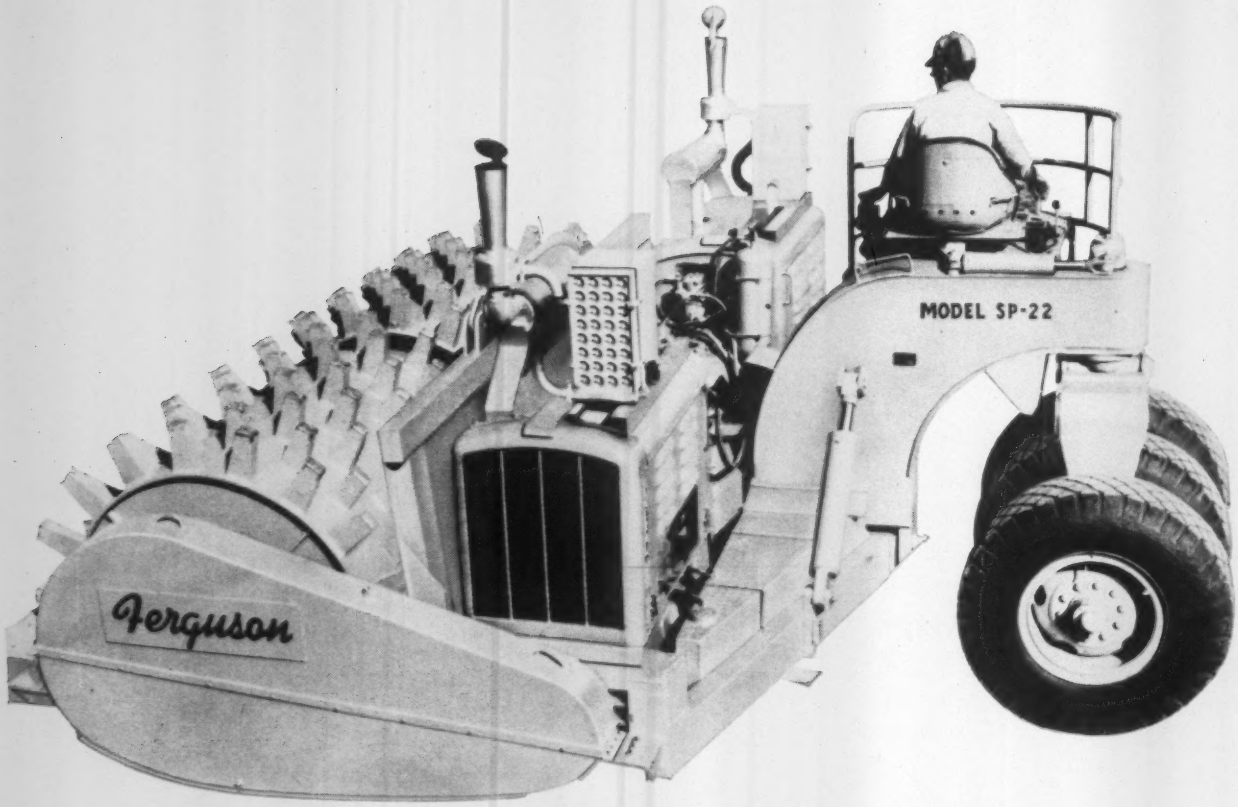

Why Ferguson put Timken® bearings on this giant new roller

When the hundreds of feet on the drums of this new Ferguson SP-22 tamping roller run over ground, it's like hitting the earth thousands of times a minute. To take the thousands of shocks, Shovel Supply Co., the roller builder, specified Timken® tapered roller bearings for the drums, wheels and steering kingpin.

Their tapered design lets Timken bearings take *any* combination of radial and thrust loads. Full-line contact between rollers and races gives Timken bearings extra load-carrying capacity. When the roller runs or turns on level or uneven ground, Timken bearings take the shocks from any direction. And precision manufacture assures bearing accuracy to give long trouble-free, practically friction-free life with minimum maintenance.

EXTRA SAVINGS are yours when you use the services of Timken Company graduate sales engineers. Working with you at the design stage, they can often solve bearing problems on-the-spot.

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